

Thursday 18/02/16 – Friday 19/02/16

8. SGS-Jahrestagung | Bern | 18.-19.02.2016

8e congrès annuel 4S | Berne | 18.-19.02.2016

«Sportwissenschaft — im Singular!» «Science du sport — au singulier!»

– Book of Abstracts –



Editors: Klostermann, A., & Hossner, E.-J.

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Short Programme

Thursday 18/02/16

08.00h	Registration		
09.15h	HS: Opening Session		
09.45h	HS: Höner „Sportwissenschaft Im Singular: Notwendigkeit oder Trugschluss“		
10.30h	<i>Coffee Break</i>		
11.00h	HS: Fall Prevention	SR1: Biomechanics	SR2: Motor Control
12.30h	<i>Lunch Break</i>		
13.30h	SR1: YIA Natural Sciences	SR2: YIA Social Sciences	
14.30h	<i>Short Break</i>		
14.45h	HS: Schneesportforschung	SR1: Medicine	SR2: Pedagogy
16.15h	<i>Coffee Break</i>		
16.45h	HS: Binswanger „Sinnlose Wettbewerbe in der Wissenschaft“		
17.30h	SR1: SGS/4S General Assembly		
18.30h	GS: Poster Session		
20.00h	GS: Conference Dinner / YIA Award		

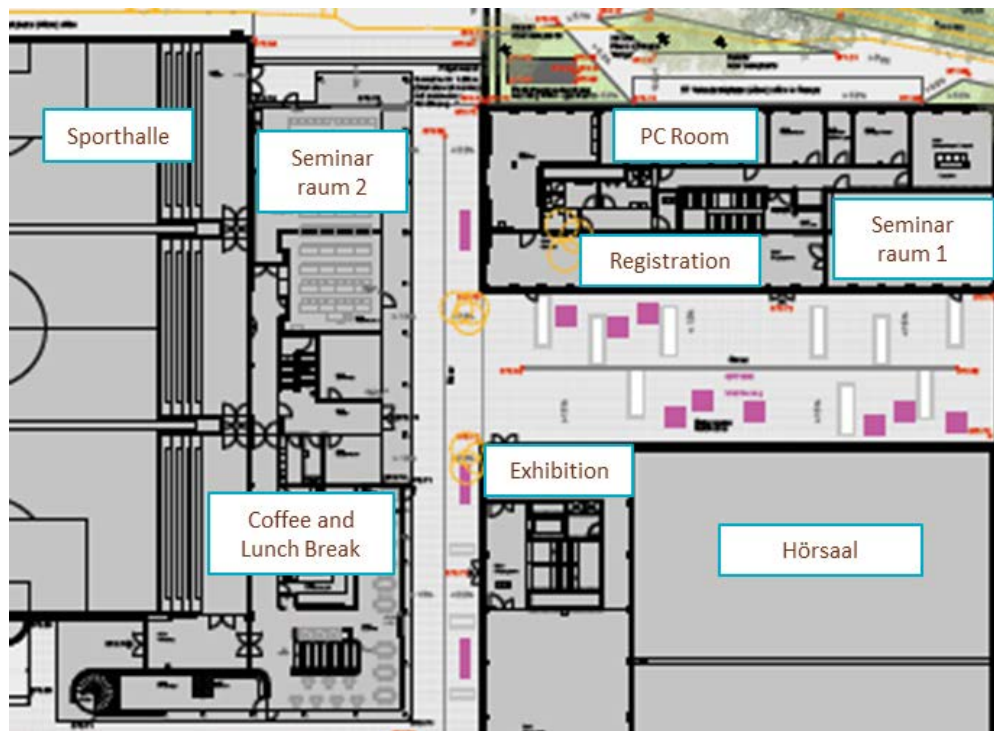
Friday 19/02/16

08.30h	HS: Vickers „The Quiet Eye: Does It Underlie the 'Hot Hand' in Sport?“		
09.15h	<i>Short Break</i>		
09.30h	HS: Theorie & Sportpraxis 1	SR1: Exercise Science	SR2: Sociology
11.00h	<i>Coffee Break</i>		
11.30h	SH: Theorie & Sportpraxis 2	SR1: Physiology	SR2: Psychology
13.00h	<i>Lunch Break</i>		
14.00h	HS: Best Practice „Zwischen Elfenbeinturm und Sportwissenschaft“		
15.30h	HS: Closing Session		
15.45h	<i>Departure</i>		

HS = Hörsaal | SR1&2 = Seminarräume 1 & 2 | GS = Restaurant Grosse Schanze | SH = Sporthalle

Non-Scientific Programme

- (1) **Registration**
ZSSw-Building C / Registration Desk / Thursday 18/02/16/8.00h – Friday 19/02/16/15.30h
- (2) **Opening Session**
Hörsaal / Thursday 18/02/16 / 09.15-09.45h
with welcoming speeches by
 - Prof. Dr. Ernst-Joachim Hossner (Universität Bern, Tagungspräsident)
 - Prof. Dr. Christian Leumann (Universität Bern, Vizerektor Forschung)
 - Prof. Dr. Achim Conzelmann (Universität Bern, SGS/4S-Präsident)
 - Dr. André Klostermann (Universität Bern, Tagungsleiter)
- (3) **Closing Session**
Hörsaal / Friday 19/02/16 / 15.30-15.45h
- (4) **SGS/4S General Assembly**
Hörsaal / Thursday 18/02/16 / 17.30-18.30h
- (5) **PC / E-Mail Access**
ZSSW-Building C / Room C008 / Thursday 18/02/16/8.00h – Friday 19/02/16/15.30h
- (6) **Coffee & Lunch Breaks**
ZSSw-Cafeteria / times as announced in the short programme
- (7) **Conference Dinner**
Grosse Schanze / Thursday 18/02/16 / 20.00-24.00h
- (8) **Sponsors' Exhibition**
ZSSW-Building C / Thursday 18/02/16/8.00h – Friday 19/02/16/15.30h
with presentations by
 - COSMED
 - Neurolite
 - Neurospec



Thursday 18/02/16 – Friday 19/02/16 / Lab Visit

ZSSw-Building C / Second Basement (Level -2)

Organisers: Kredel R¹, Prelz C¹, Erlacher D¹

¹Institute of Sport Science, University of Bern, Switzerland

Lab Visit



In the course of the extension of the University's Center for Sport and Sport Science (ZSSw) in 2015, a spacious research-laboratory area has been embedded into the second basement of the Building C. This area includes a large Sensorimotor Laboratory with CAVE-like 3D projections, a 3D sound system, force platforms and a VICON-integrated eye-tracking system. In addition, a radiation-shielded Electrophysiology Laboratory, mainly for the purposes of sleep and dream research, a Behavioural Laboratory with miscellaneous devices like a golf simulator, a rifle range, a table-tennis robot and a stabilometer, as well as two cubicles for PC-based experiments were integrated. The laboratory area will be open for individual free visits over the following coffee and lunch breaks of the SGS/4S conference:

- Thursday 18/02/16 / 12.30-13.30 (Lunch Break)
- Thursday 18/02/16 / 16.15-16.45 (Coffee Break)
- Friday 18/02/16 / 11.00-11.30 (Coffee Break)
- Friday 18/02/16 / 13.00-14.00 (Lunch Break)

(for the lab visit, there is no individual abstract available)

Plenary Session 1 / Thursday 18/02/16 / 09.45-10.30

Hörsaal: Keynote 1

Chair: Conzelmann A¹

¹Institut für Sportwissenschaft, Universität Bern, Schweiz

Sportwissenschaft im Singular: Notwendigkeit oder Trugschluss?



Prof. Dr. Oliver Höner
(Eberhard-Karls-Universität Tübingen, Tübingen, Deutschland)

(for keynote lectures, there are no individual abstracts available)

Oral Sessions / Thursday 18/02/16 / 11.00-12.30h

Hörsaal: Interdisciplinary Session

Organisers: L. Donath, D. Hammes, J. Ruffieux, & E. D. de Bruin

Neuromuscular and cognitive aspects of exercise training in seniors: Recent and traditional approaches of exercise-based fall prevention (*e*)

Seminarraum 1: Disciplinary Session „Biomechanics“

Chair: S. Lorenzetti

11.00-11.15h: **R. Kredel, A. Eisele, & H. Riehle**

Einfluss des Trampolinsprungtuchs auf Sprunghöhe, Reaktionskräfte und Vertikalbeschleunigung an der Brustwirbelsäule (*d*)

11.15-11.30h: **M. Plüss, F. Schellenberg, & S. Lorenzetti**

Modelling of motion and loading of M. gluteus medius during strength training exercises for the hip using cable (*e*)

11.30-11.45h: **F. Schellenberg, R. Häberle, N. Schmid, & S. Lorenzetti**

Loading conditions and movement pattern during back-extension exercises (*e*)

11.45-12.00h: **D. Staudenmann, J. Robadey, & W. Taube**

Consideration of kinetic, potential and elastic energy acting on the center of mass while running (*e*)

12.00-12.15h: **R. Ammann & T. Wyss**

Gait asymmetry during 400 to 1000 m track running in relation to injury history (*e*)

12.15-12.30h: **J. M. Bekker, U. Arnet, H. E. J. Veeger, & L. H. V. van der Woude**

Scapular kinematics in able-bodied, novice subjects during manual wheelchair propulsion (*e*)

Seminarraum 2: Disciplinary Session „Motor Control“

Chair: N. Wenderoth

11.00-11.15h: **C. Vater, A. Klostermann, & E.-J. Hossner**

Impairments of peripheral motion change detection during smooth pursuit eye movements (*e*)

11.15-11.30h: **F. Thomas, M. Bächinger, A. Bosshard, & N. Wenderoth**

Contributions of peripheral and central mechanisms to performance reductions during finger tapping tasks (*e*)

11.30-11.45h: **K. Hegazy & A. Sherif**

The impact of mental practices of motor performance of tennis skills in young boys and girls (*e*)

11.45-12.00h: **R. Roth, A. Betschart, L. Donath, L. Zahner, & O. Faude**

Strength and balance development during one competitive season in high level female football players (*e*)

12.00-12.15h: **M. Wälchli, A. Mouthon, J. Ruffieux, M. Keller, & W. Taube**

Trainability of postural control in prepubertal children (*e*)

12.15-12.30h: **C. Herrmann, U. Pühse, & H. Seelig**

Evaluation of basic motor competencies in primary school – Development of test instruments (*d*)

(for details on the contributions to the disciplinary sessions, see individual abstracts, and for an outline of the interdisciplinary session, see abstract Donath, Hammes, Ruffieux & de Bruin)

Oral Sessions / Thursday 18/02/16 / 13.30-14.30h

SGS/SSSS Young Investigator Award

– Final-Round Presentations–

Seminarraum 1: Young Investigator Award „Natural Sciences“

Chair: W. Taube

13.30-13.45h: **K. S. Bieri, S. M. Scholz, S. Kohl, C. Roeder, & L. P. Staub (Universität Bern)**

Return to work after dynamic intraligamentary stabilization versus conventional ACL reconstruction (*d*)

13.45-14.00h: **A. Mouthon, P. Weissbaum, L. Brunetti, J. Ruffieux, & W. Taube (Universität Freiburg)**

Changes in intracortical inhibition in response to balance training (*f*)

14.00-14.15h: **D. Neyroud, B. Kayser, & N. Place (Universität Lausanne)**

Why do we stop exercising? Insights from task failure of sustained isometric contractions (*e*)

14.15-14.30h: **N. Spörri, C. Vater, S. Lorenzetti, & E.-J. Hossner (ETH Zürich/Universität Bern)**

Reduced foveal vision enhances peripheral monitoring and peripheral event detection (*d*)

Seminarraum 2: Young Investigator Award „Social Sciences“

Chair: M. Schmidt

13.30-13.45h: **J. Cornaton (ETH Zürich)**

Les origines clivantes du sport pour handicapés physiques en Suisse (1956-1968) (*f*)

13.45-14.00h: **V. Gesbert (Universität Lausanne)**

Analysis of collective activity in soccer: Interpersonal coordination and shared understanding (*f*)

14.00-14.15h: **C. Hayoz, C. Klostermann, T. Schlesinger, & S. Nagel (Universität Bern)**

Zur Bedeutung sportbezogener Verhaltensmuster in der Familie für die Sportpartizipation Jugendlicher (*e*)

14.15-14.30h: **S. Seiler (Universität Basel)**

The influence on learning outcomes in Physical Education (PE) (*e*)

(for details on the contributions to the Young Investigator Award, see individual abstracts)

Oral Sessions / Thursday 18/02/16 / 14.45-16.15h

Hörsaal: Interdisciplinary Session

Organisers: P. Läubli

Leistungsentwicklung im Schneesport durch gezielte Forschung (d)

Seminarraum 1: Disciplinary Session „Medicine“

Chair: P. Hauw

14.45-15.00h: **C. Höchsmann, M. Schüpbach, & A. Schmidt-Trucksäss**

Effects of exergaming on physical activity in overweight individuals – a systematic review (e)

15.00-15.15h: **K. Imhof, O. Faude, L. Zahner, A. Schmidt-Trucksäss, & H. Hanssen**

Associations between blood pressure categories, physical activity and cardiorespiratory fitness on retinal vessel diameters in 6 to 8 year old school children (e)

15.15-15.30h: **S. Endes, E. Schaffner, S. Caviezel, J. Dratva, C. S. Autenrieth, M. Wanner, B. Martin, D. Stolz, M. Pons, A. Turk, R. Bettschart, C. Schindler, N. Künzli, N. Probst-Hensch, & A. Schmidt-Trucksäss**

Long-term physical activity is associated with reduced arterial stiffness in older adults: longitudinal results of the SAPALDIA cohort study (e)

15.30-15.45h: **F. Streckmann, H. C. Lehmann, O. Faude, L. Zahner, W. Bloch, & F. T. Baumann**

Specific exercise interventions can reduce the symptoms of chemotherapy-induced peripheral neuropathy (e)

15.45-16.00h: **F. M. Bossuyt, U. Arnet, M. W. G. Brinkhof, I. Eriks-Hoogland, V. Lay, R. Müller, M. Sunnåker, & T. Hinrichs**

Shoulder pain in individuals with spinal cord injury: Results from a community survey in Switzerland (e)

16.00-16.15h: **J. L. Flueck, K. Hartmann, C. Perret, & M. Strupler**

Prevalence of vitamin D deficiency in Swiss elite wheelchair athletes (e)

Seminarraum 2: Disciplinary Session „Pedagogy“

Chair: A. Gogoll

14.45-15.00h: **S. Büchel**

Lehrermotivation im Sportunterricht (e)

15.00-15.15h: **S. Seiler & C. Herrmann**

Macht oder Ohnmacht der Lehrpersonen? Subjektive Reinterpretation der Bedingungsfaktoren schulischer Lernleistungen im Sportunterricht (e)

15.15-15.30h: **M. Schmidt, M. Kamer, & A. Conzelmann**

Die Effekte unterschiedlicher Bewegungspausen auf die Aufmerksamkeit von Primarschulkindern – Zur Bedeutung des Affekts (d)

15.30-15.45h: **C. Herrmann, C. Heim, U. Pühse, & H. Seelig**

Der Entwicklungsverlauf motorischer Basiskompetenzen in der ersten Primarschulklasse (d)

15.45-16.00h: **R. Messmer & J. Vogler**

Fachdidaktisches Wissen und Können von Sportlehrpersonen (d)

16.00-16.15h: **A. Gogoll & E. Jeisy**

Wann ist Abseits? Modellbasierte fachliche und sprachliche Aufgabenentwicklung im Fachbereich Bewegung und Sport (d)

(for details on the contributions to the disciplinary sessions, see individual abstracts, and for an outline of the interdisciplinary session, see abstract Läubli)

Plenary Session / Thursday 18/02/16 / 16.45-17.30h

Hörsaal: Keynote 2

Chair: Nagel S¹

¹Institut für Sportwissenschaft, Universität Bern, Schweiz

Sinnlose Wettbewerbe in der Wissenschaft



Prof. Dr. Mathias Binswanger
(Fachhochschule Nordwestschweiz, Olten, Schweiz)

(for keynote lectures, there are no individual abstracts available)

General Assembly / Thursday 18/02/16 / 17.30-18.30h

Seminarraum 1: 8. Ordentliche Generalversammlung / 8e assemblée générale ordinaire
Organisation: SGS/4S

Traktandenliste

(1)	Begrüssung Mot de bienvenue	A. Conzelmann
(2)	Wahl der Stimmzähler Election des scrutateurs	A. Conzelmann
(3)	Protokoll 7. Generalversammlung Procès-verbal de la 7e assemblée générale	A. Conzelmann
(4)	Berichte Geschäftsjahr 2015 Rapports sur l'exercice 2015 > Current Issues in Sport Science (CISS)	Vorstand / Comité E.-J. Hossner
(5)	Rechnung 2015 Comptes 2015 > Bericht der Revisoren Rapport des réviseurs	M. Schmidt M. Dittler/ H. Kempf
(6)	Wahlen Election	
(7)	Ziele und Tätigkeiten 2016 Buts et activités 2016	Neuer Präsident / Nouveau Président
(8)	Budget 2016	M. Schmidt
(9)	Varia Divers > Weitere Wortmeldungen Autres annonces	Alle / Tous

Alle Tagungsteilnehmer/innen sind herzlich dazu eingeladen, auch die Generalversammlung zu besuchen. Stimmberechtigt sind jedoch allein SGS/4S-Mitglieder.

Im Anschluss an die Generalversammlung verschieben wir ins Restaurant „Grosse Schanze“, in dem – begleitet von einem Apéro – die Poster-Session stattfinden wird.

Grosse Schanze: Poster Session

Organisers: C. Vater & A. Klostermann

„Psychology“

(1) C. Zuber, M. Zibung, & A. Conzelmann

Die Frühspezialisierung von Juniorennationalspielern im Fussball: Ein Vergleich zweier Generationen

(2) V. Benzing, T. Heinks, A. Conzelmann, & M. Schmidt

Cognitively engaging exergaming immediately enhances executive function and impacts heart rate variability in adolescents

(3) S. Ludyga, F. Colledge, M. Gerber, & U. Pühse

Applying the selective improvement hypothesis to educational settings: Effects of running exercise on inhibitory control, working memory and long-term memory in university students attending a seminar

(4) T. Astolfi & D. Hauw

Surpassing the limits in sport: Proposal for a renewed theoretical and methodological approach

(5) S. Steiner & M. Scherer

Zonal playfield attributes – A stochastic approach to subjective passing affordances in football

„Motor Control“

(6) T. Hausegger, C. Vater, & E.-J. Hossner

Peripheral vision in martial arts: How anchoring gaze helps athletes in Kung Fu and Tae Kwon Do

(7) A. Klostermann & P. Küng

Gaze strategies in skateboard trick jumps: Spatio-temporal constraints in complex locomotion

(8) Y.-A. Kuhn, M. Keller, J. Ruffieux, & W. Taube

Behavioral adaptations to an external focus of attention are accompanied by changes in the primary motor cortex

(9) D. Erlacher, I. Nefjodov, & A. Winkler

Balancieren im Traum: Auswirkung von Wii-Balance-Board-Spielen auf Traum inhalte

(10) E. Kurz, O. Faude, R. Roth, L. Zahner, & L. Donath

Aging effects on single-leg standing balance performance strategies

„Exercise Science“

(11) G. Schönbächler, O. Faude, L. Zahner, & L. Donath

Decline of hand-grip strength endurance in different arm positions does not differ between recreational and ambitious climbers

(12) K. Schaffner, C. Besson, G. Gremion, & F. Degache

Interest of abductors/adductors isokinetic strength testing in elite hockey players

(13) F. Brocherie, O. Girard, & G. P. Millet

Specific fatigue development during an international ice-hockey game

(14) L. Heyer, T. Villemin, & M. Romann

De la probabilité de réussir sa meilleure performance de la saison lors d'un championnat international en athlétisme

(15) N. Beeler, L. Roos, & T. Wyss

Influence of a new sport program on recruits' physical fitness during basic military training

(16) K. Wick, O. Faude, L. Zahner, S. Schwager, & L. Donath

A preliminary standing desk intervention in 10- to 12-years old primary school children – Effects on standing time measured by accelerometer, external observation and self-reports

„Medicine“

(17) C. Diriwächter & C. Wechsler

activdispens.ch – Bewegen trotz Sportdispens

(18) F. Colledge, M. Vogel, K. Dürsteler, U. Pühse, & M. Gerber

Qualitative and quantitative findings from a randomized controlled pilot study of exercise as an adjunct therapy in a heroin assisted treatment setting

(19) M. Poussel, S. Didier, B. Chenuel, J. C. Vauthier

Substance use and misuse in an extreme mountain ultra-marathon

(20) A. Rossmeißl, S. Lenk, H. Hanssen, L. Donath, A. Schmidt-Trucksäss, & J. Schäfer

ZumBeat: Evaluation of a Zumba dance intervention in postmenopausal overweight women

(21) A. Deiseroth, M. Nussbaumer, V. Drexel, G. Hertel, A. Schmidt-Trucksäss, M. Halle, & H. Hanssen

Effects of marathon running on arterial stiffness in lean and obese athletes with different fitness levels

„Physiology“

(22) M. Nussbaumer, L. Donath, J. Schäfer, O. Faude, L. Zahner, A. Schmidt-Trucksäss, & H. Hanssen

Effects of acute bouts of high-intensity interval training on retinal vessel diameters in seniors and young adults

(23) O. Girard, G. P. Millet, & J. P. Micallef

Mechanical alterations during a 800-m self-paced run

(24) O. Girard, F. Brocherie, & G. P. Millet

Rapid muscle torque production following repeated treadmill sprints at different levels of normobaric hypoxia

(25) J. J. Saugy, R. Heinzer, T. Rupp, R. Faiss, N. Bourdillon, & G. P. Millet

Comparison of sleep disorders between real and simulated high altitude

(26) E. du Fay de Lavallaz, D. Drum, R. Allemann, G. Neve, & L. Donath

Acute exposure to moderate altitude compromises standing balance performance but not spatio-temporal gait parameters after 40 minutes of light walking in young community-dwelling seniors

(for details on the contributions, see individual abstracts)

Plenary Session / Friday 19/02/16 / 08.30-09.15h

Hörsaal: Keynote 3

Chair: Hossner E-J¹

¹Institut für Sportwissenschaft, Universität Bern, Schweiz

The Quiet Eye: Does It Underlie the „Hot Hand” in Sport? Applied and Theoretical Perspectives



Prof. Dr. Joan Vickers
(University of Calgary, Calgary, Canada)

(for keynote lectures, there are no individual abstracts available)

Oral Sessions / Friday 19/02/16 / 09.30-11.00h

Hörsaal: Interdisciplinary Session

Organisers: G. Grossrieder, K. Haller, A. Krebs, & C. Oggenfuss-Ranft

Verknüpfung von Theorie und Sportpraxis in der Lehre – Teil 1: Diskussion und Austausch bestehender Konzeptionen an verschiedenen Hochschulen (d/f/e)

Seminarraum 1: Disciplinary Session „Exercise Science“

Chair: A. Schmidt-Trucksäss

09.30-09.45h: **R. Sieghartsleitner, C. Zuber, M. Zibung, & A. Conzelmann**

Perspektiven der Talentforschung im Fussball: Fundierung eines Subsystems „Motorik“ (d)

09.45-10.00h: **S. Ludyga, T. Gronwald, & K. Hottenrott**

Does the neural efficiency hypothesis apply to cyclists performing an exercise bout? (d)

10.00-10.15h: **E. Bucher, R. Roth, Ø. Sandbakk, & O. Faude**

Effects of exercise induced trunk fatigue on trunk strength and double poling performance in junior cross-country skiers (e)

10.15-10.30h: **F. Engel & S. Altmann**

Effekte von Kompressionskleidung auf Leistung und Regeneration bei Langstreckenläufern – Eine systematische Übersichtsarbeit (e)

10.30-10.45h: **L. Roos & T. Wyss**

Injury rates in relation to training load in elite orienteering athletes (e)

10.45-11.00h: **T. Hinrichs, B. Bücker, R. Klaußen-Mielke, M. Brach, S. Wilm, P. Platen, & A. Moschny**

Effects of a home-based exercise program for chronically ill and mobility-limited older adults supported by general practitioner practices – a randomized controlled trial (e)

Seminarraum 2: Disciplinary Session „Sociology“

Chair: W. Mengisen

09.30-09.45h: **J. Clausen, E. Bayle, D. Giauque, K. Ruoranen, C. Klenk, T. Schlesinger, & S. Nagel**

International sport federations: Drivers for and barriers to professionalization (e)

09.45-10.00h: **C. Klostermann, C. Hayoz, T. Schlesinger, & S. Nagel**

Zur Bedeutung der Sport- und Bewegungsinfrastruktur im kommunalen Kontext für das Sportverhalten Jugendlicher und junger Erwachsener (e)

10.00-10.15h: **L. Schoch**

The “splendid isolation”: How Swiss sports journalists deal with their professional reputation (e)

10.15-10.30h: **C. Perret, K. Hartmann, S. Haefeli, & A. Frotzler**

Is there a relative age effect in Paralympic sport? - An analysis of three different sport disciplines at the London Paralympic Games 2012 (e)

10.30-10.45h: **A. Schumacher Dimech, J. Fischer, A. Brechbühl, & R. Seiler**

Evaluation of an inventory for the assessment of critical incidents involving football fans (e)

10.45-11.00h: **A. Gebert, U. Pühse, M. Gerber, P. Gassmann, & M. Lamprecht**

Soccer injuries in Switzerland – A retrospective survey (d)

(for details on the contributions to the disciplinary sessions, see individual abstracts, and for an outline of the interdisciplinary session, see abstract Grossrieder, Haller, Krebs, & Oggenfuss-Ranft)

Oral Sessions / Friday 19/02/16 / 11.30-13.00h

Sporthalle: Interdisciplinary Session

Organisers: G. Grossrieder, K. Haller, A. Krebs, & C. Oggenfuss-Ranft

Verknüpfung von Theorie und Sportpraxis in der Lehre – Teil 2: Vernetzungsbeispiel in die sportliche Praxis des Geräteturnens (*d/f/e*)

Seminarraum 1: Disciplinary Session „Physiology“

Chair: G. Millet

11.30-11.45h: **D. Staudenmann, M. Keller, C. Schaerer, & W. Taube**

Limiting shoulder muscles of a still rings strength element in international level gymnasts (*e*)

11.45-12.00h: **R. Knaier, J. Schäfer, A. Rossmeissl, C. Klenk, H. Hanssen, C. Cajochen, & A. Schmidt-Trucksäss**

Which exhaustion criteria for physical exercise testing are sufficient to determine VO₂max? (*e*)

12.15-12.30h: **A. Fernández Menéndez, G. Saudan, D. Hans, M. Saubade, G. Millet, & D. Malatesta**
Effect of normobaric hypoxic walking training on mechanics and energetics of gait in obese adults (*e*)

12.15-12.30h: **F. Brocherie, G. P. Millet, & O. Girard**

Psychophysiological responses of elite field hockey players to repeated-sprint in normobaric hypoxia (*e*)

12.30-12.45h: **S. J. Willis, L. Alvarez, G. P. Millet, & F. Borrani**

Effects of local blood flow restriction and systemic hypoxia on repeated sprint leg cycling performance (*e*)

12.45-13.00h: **L. Alvarez, S. J. Willis, N. Place, G. P. Millet, & F. Borrani**

Neuromuscular fatigue in repeated cycling sprints with different levels of restricted blood flow and hypoxia (*e*)

Seminarraum 2: Disciplinary Session „Psychology“

Chair: M. Gerber

11.30-11.45h: **C. Tuch, L. Roos, & T. Wyss**

Physical fitness level affects perception of chronic stress in military trainees (*e*)

11.45-12.00h: **M. Gerber, M. Börjesson, T. Ljung, M. Lindwall, & I. H. Jonsdottir**

Cardiorespiratory fitness moderates the relationship between perceived stress and cardiovascular risk factors (*e*)

12.15-12.30h: **N. Rochat, L. Seifert, & D. Hauw**

How does equipment impact on trail-runners' activity? A situated analysis of trail-runners' experience of running with carrying systems (*e*)

12.15-12.30h: **M. Wegner, R. Grätzer, & J. Schüller**

Fit of individual differences in self-regulation and situational or instructional framing in sports (*e*)

12.30-12.45h: **V. Sieber, J. Schüller, & M. Wegner**

Individual differences in the need for autonomy moderate effects of autonomy support on salivary alpha amylase (*e*)

12.45-13.00h: **U. Schnyder, & E.-J. Hossner**

Decision-making in football officiating: An interview study with top-level referees (*d*)

(for details on the contributions to the disciplinary sessions, see individual abstracts, and for an outline of the interdisciplinary session, see abstract Grossrieder, Haller, Krebs, & Oggenfuss-Ranft)

Hörsaal: Best-Practice-Presentations

Chair: Seiler R¹

¹Institut für Sportwissenschaft, Universität Bern, Schweiz

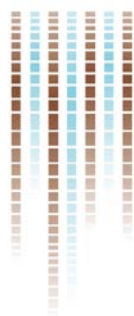
Zwischen Elfenbeinturm und Sportplatz: Sportwissenschaft problemorientiert



Contributions:

- (1) **Conz, C. (Eidgenössische Hochschule für Sport Magglingen)**
Forschung ist nicht gleich Forschung. Sportwissenschaftliche Forschung im Leistungssport aus Optik Wissensmanagement (*d*)
- (2) **Kredel, R. & Tartaruga, D. (Universität Bern / Swiss Shooting)**
Präzisionsleistungen im Luftgewehrschiessen: von der Problemidentifikation zum Trainingssystem (*d*)
- (3) **Lorenzetti, S. & Ammann, F. (ETH Zurich / Swiss-Ski)**
Biomechanics of squats, drop jumps and imitation jumps of ski jumpers (*d*)
- (4) **Valkanover, S. & Berger, R. (Universität Bern / Pädagogische Hochschule Bern)**
SelbstTanz: Selbstkonzeptfördernde Tanzvermittlung in der Schule zwischen BISSiger Wissenschafts- und unterrichtsnaher Praxisorientierung (*d*)
- (5) **Girard, O. & Brocherie, F. (University of Lausanne / Hockey Club du Mont-Blanc)**
Repeated sprint fatigue in team sports (*e*)
- (6) **Nagel, S. & Gygax, M. (Universität Bern / Swiss Orienteering)**
Sportverbandsentwicklung bei Swiss Orienteering (*d*)

(for details on the contributions 1-6, see individual abstracts, and for an outline of the whole plenary session, see abstract Hossner & Klostermann)



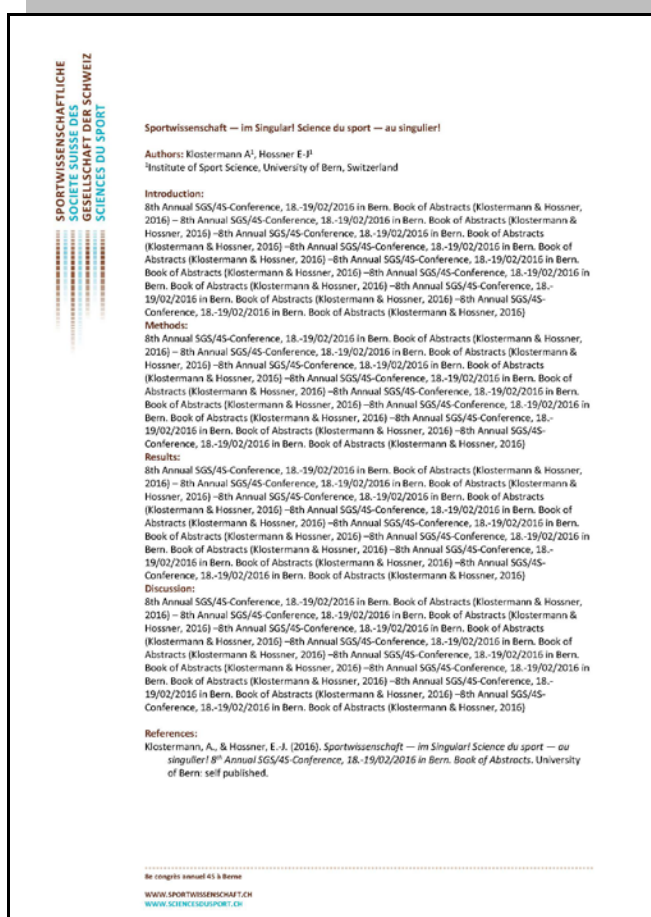
Thursday 18/02/16 – Friday 19/02/16

Individual Conference Contributions

Editors: Klostermann A¹, Hossner E-J¹

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Abstracts



Note:

Subsequently, individual one-sided abstracts are listed in alphabetic order (first author's or first organiser's name) for the following kinds of submissions:

- Outline of the Best-Practice Session
- Individual contributions to the Best-Practice Session
- Individual contributions to the SGS/4S Young Investigator Award
- Outlines of Interdisciplinary Sessions
- Individual contributions to Disciplinary Oral Sessions
- Individual contributions to the Poster Session

No abstracts are available for the following kinds of submissions:

- Keynote Lectures
- Outlines of the SGS/4S Young Investigator Award Sessions
- Individual Contributions to Interdisciplinary Sessions
- Outlines of the Disciplinary Oral Sessions
- Outline of the Poster Session
- Events of the Non-Scientific Programme (incl. Lab Visit)

Neuromuscular fatigue in repeated cycling sprints with different levels of restricted blood flow and hypoxia**Authors:** Alvarez L¹, Willis SJ¹, Place N¹, Millet GP¹, Borrani F¹¹ISSUL, Institute of Sport Sciences, Department of Physiology, Faculty of Biology and Medicine, University of Lausanne, Lausanne, Switzerland**Introduction:**

In supramaximal exercises such as repeated sprinting (RSA), neuromuscular fatigue can lead to reduced power output even though the task may be sustained. It is known that fatigue can be related to central (neural) or peripheral (muscle) alterations depending upon the task. However, fatigue may appear prematurely in hostile environments such as hypoxia or under restricted blood flow (BFR) (Amann et al., 2006). The induced ischemia during BFR creates a local hypoxic environment, which affects intramuscular function and motor unit recruitment thus exacerbating fatigue (Scott, Slattery, Sculley, & Dascombe, 2014). To the best of our knowledge, no previous research has investigated the effect of BFR and hypoxia on neuromuscular fatigue during repeated sprints, which was therefore the aim of the current study.

Methods:

Eleven athletes (6 men; 5 women) (26.7±4.2 yrs; 68.0±14.0 kg; 172±12 cm) participated in the study including one familiarization session followed by nine experimental trials (0%, 45%, 60%BFR; and 400m, 2000m, 3800m simulated altitude, respectively). Subjects were familiarized with neuromuscular stimulation and maximal voluntary contraction (MVC). Each test session included RSA until exhaustion with the assessment of MVC, central activation (twitch interpolation technique), as well as electrical evoked force at rest (twitch) and doublet at frequencies of 10Hz (P10) and 100Hz (P100) pre- and post-RSA. Power output was obtained during RSA. Two way repeated measures ANOVA were performed to assess differences pre- to post- (condition x time) and between conditions (hypoxia x occlusion) with Bonferroni post-hoc test ($p < 0.05$).

Results:

Voluntary activation level (VAL) decreased pre- to post- at 60%BFR independent of altitude (by 15.6, 17.2, and 16.2 % at 400m, 2000m, and 3800m, respectively, $P < 0.001$). Additionally, a 7.1% decrease ($P < 0.05$) was observed in 45%BFR-3800m. The normalization of RMS by the M-wave also decreased ($P < 0.001$) at post in 60%BFR independent of altitude (by 36.2%, 43.4%, and 41.5%). The P10, P100, P10/P100, and twitch decreased pre- to post- ($P < 0.001$) across all conditions. Specifically, there was a difference with increased hypoxia for P10 ($P < 0.05$), P100 ($P < 0.01$) and twitch ($P < 0.05$). In addition, the difference with increased occlusion was demonstrated for P100 ($P < 0.01$) and twitch ($P < 0.05$). Power output decreased throughout all conditions with an effect of hypoxia and occlusion ($P < 0.001$).

Discussion:

Indeed, the RSA-induced central and peripheral fatigue parameters were different across conditions. Previous research has suggested that peripheral fatigue is closely controlled during exercise, meaning that central motor drive and thus performance (power output) may be self-regulated to prevent muscle fatigue from rising above a tolerated level (Gandevia, 2001). Accordingly, in the current study, the peripheral factors (P10, P100, and twitch) were affected in all conditions, while the central factors (VAL and RMS/M) were affected solely by 60%BFR conditions independent of altitude. Thus, central drive seems to be more affected by higher levels of occlusion than hypoxia, even when peripheral fatigue occurs.

References:

- Amann, M., Eldridge, M. W., Lovering, A. T., Stickland, M. K., Pegelow, D. F., & Dempsey, J. A. (2006). Arterial oxygenation influences central motor output and exercise performance via effects on peripheral locomotor muscle fatigue in humans. *The Journal of Physiology*, 575(Pt 3), 937-952.
- Gandevia, S. C. (2001). Spinal and supraspinal factors in human muscle fatigue. *Physiological Reviews*, 81(4), 1725-1789.
- Scott, B. R., Slattery, K. M., Sculley, D. V., & Dascombe, B. J. (2014). Hypoxia and resistance exercise: A comparison of localized and systemic methods. *Sports Medicine*, 44(8), 1037-1054.

Gait asymmetry during 400 to 1000 m track running in relation to injury history**Authors:** Ammann R^{1,2}, Wyss T²¹Swiss Federal Institute of Sport Magglingen (SFISM), Magglingen, Switzerland²University of Fribourg, Department of Medicine, Movement and Sport Science, Fribourg, Switzerland**Introduction:**

Athletes and coaches assume that running asymmetry affects athletic performance. However, scientific research is sparse, and therefore, a value for normal or natural running asymmetry between legs or a threshold at which this asymmetry becomes problematic is still to be defined. Additionally, it is not known whether emerging fatigue would be mirrored by changes in running asymmetries during a complete training session. Hence, the purpose of this study was to investigate running asymmetries in healthy ambitious runners during track runs over various distances. Furthermore, to evaluate the effect of previous injury history on running asymmetry and whether asymmetry changes within the course of exhausting training sessions.

Methods:

Data of twelve male and female (35.7 ± 10.1 years, 68.3 ± 10.3 kg, 1.74 ± 0.09 m) middle- to long-distance athletes (410 \pm 205 min weekly training practice) were obtained during eight interval training sessions on a synthetic track. Training contents were two times 10x400 m, 8x600 m, 7x800 m, and 6x1000 m, respectively, and were accomplished at subjective intensities of 80 - 100%. By means of the valid and reliable inertial measurement unit Axiamote (Axiamo, Biel, Switzerland; 1000 Hz), ground contact time (GCT) of every step was assessed (Ammann, Taube, & Wyss, in press). Running asymmetry was calculated as the difference in GCT between right and left foot divided by the GCT of the left foot. Injury history of the previous 24 months was inquired using an online questionnaire.

Results:

In total, 641 interval runs were performed with an average speed of $4.8 \text{ m}\cdot\text{s}^{-1}$ (ranging from $3.9 - 5.9 \text{ m}\cdot\text{s}^{-1}$) and GCT of 197.7 ms (ranging from 164.7 - 242.3 ms). Overall running asymmetries were $3.3 \pm 1.4\%$. Linear regression analysis revealed previous injury ($p < .001$), shorter running distance ($p = .030$) and shorter GCT ($p = .001$) as significant predictors of enlarged asymmetry ($F_{3,636} = 20.279$, $p < .001$, $R^2 = .087$). Asymmetry was enlarged in runners with a previous injury compared to those without injury ($3.6 \pm 1.6\%$ vs. $3.0 \pm 1.2\%$; $p < .001$). In case of a previous injury, the GCT of the injured side was five times more likely to be prolonged than the GCT of the non-injured side. Shorter running distance correlated with faster speed and shorter GCT and led to enlarged running asymmetries ($r = -.175$, $p < .001$). No asymmetry changes within interval training sessions were demonstrated, nor within groups with and without a previous injury.

Discussion:

Ambitious runners showed low running asymmetries ($3.3 \pm 1.4\%$) during intensive interval runs over different distances, regardless of a previously incurred injury. This finding confirms and extends the previously reported 3.5% running asymmetry in distance runners (Kong & de Heer, 2008). Yet, as that study was conducted on treadmill with only six gait cycles at each speed (ranging from $3.5 - 5.4 \text{ m}\cdot\text{s}^{-1}$), running asymmetry in the field over longer periods was not analyzed. In the present study, athletes with a previous injury had enlarged asymmetries, but still low values. Furthermore, asymmetry might be more of an issue during faster speeds, as asymmetry was increased in the shorter interval runs. Emerging fatigue within training sessions did not induce progression in running asymmetries in either group. However, as individual asymmetry is masked when averaging group data, analyses should be kept individualized, especially, in the high performance section. By means of the device Axiamote, regular monitoring of GCT and asymmetries is feasible for diagnostic and prognostic purposes.

References:

- Ammann, R., Taube, W., & Wyss, T. (in press). Accuracy of PARTwear inertial sensor and Optojump optical measurement system for measuring ground contact time during running. *Journal of Strength and Conditioning Research*.
- Kong, P. W., & de Heer, H. (2008). Anthropometric, gait and strength characteristics of Kenyan distance runners. *Journal of Sports Science and Medicine*, 7(4), 499-504.

Surpassing the limits in sport: Proposal for a renewed theoretical and methodological approach**Authors:** Astolfi T¹, Hauw D¹¹Institute of Sport Sciences (ISSUL), Lausanne, Switzerland**Introduction:**

We have all heard about amazing stories, when someone said they had “surpassed themselves” or went beyond their limits. Despite the traditional cognitivist view that associated “surpassing” with “coping” when faced with a hostile environment or the psychoanalytical view that set the limits to be surpassed in the unconscious of individuals, there is a lack of clear and empirical definition of these concepts. The purpose of this research is to analyse the literature and define ways to delineate a theoretical and methodological foundation for studying the notions of “surpassing” and “limits” in sport.

Methods:

A literature review on “surpassing the self in sport” was first carried out on the database *Web of Sciences*. Sixty-one key words were used. Fifty-two non-sport related words were discarded. The key words: “exceptional human performance”, “exploit”, “perfectionism”, “sensation seeking”, “willpower”, “coping”, “better personal best”, “outperform personal best”, “extreme performance” were kept to build a framework of the notions.

Results:

The literature has shown fields where the notion of “surpassing” in sport can be identified. Voluntary surpassing and involuntary surpassing are the major distinctions. Models are proposed to analyse the notion of voluntary surpassing (personality, motivation, emotional, coping, situational, cognitive, psycho-physiological and societal models). However, the “surpassing mechanism” remains incomplete. We do not know the corporal involvement, the emotions and cognitions that are parts of the dynamic evolution involved in those contexts. Recent efforts in sociological or philosophical analysis have however highlighted the importance of taking into account individual meaning in order to understand the act of surpassing and the notion of limits (e.g., Routier & Soulé, 2012). However, this level of analysis ignores the analysis of psychological and behavioural processes.

Discussion:

This review shows three limitations: a) the variety of situations related to surpassing in a sport context have not been investigated, b) the limits are considered either from the environment or from personal characteristics and c) the different components of the psychological activity involved have not been fully studied. Firstly we propose an enactive approach where cognitive science should provide a fruitful way to investigate the processes involved in such situations (e.g., Stewart et al., 2014). Secondly, these processes should be analysed in a variety of situations of surpassing. To do so, we build an observatory of practice that enables us to detect and analyse in detail the situated activities in which surpassing emerged. Potential sports and practice where surpassing could appear or are frequently mentioned are selected (e.g. elite sport in extreme situations, abnormal events in sport). Two types of data collection are used: a) verbal data from self-confrontational interviews of past activity in order to build an individual’s “course of action” (e.g., Hauw & Durand, 2007), b) third person description of the activity per se (e.g. physiological indicators...). The “course of action” corresponding to a surpassing activity is analysed to identify precisely the action organisation. Third person data is then linked to identify the behavioural or physiological components in actions. Using this mixed approach we thus expected to furnish a more detailed description of the process involved during surpassing and provide complementary data sets for situated activity theory on sport performance according to an enactive approach.

References:

- Hauw, D., & Durand, M. (2007). Situated analysis of elite trampolinists’ problems in competition using retrospective interviews. *Journal of Sport Sciences*, 25(2), 173-183.
- Routier, G., & Soulé, B., (2012). L’engagement corporel: une alternative au concept polythétique de sports à risque en sciences sociales. *Movement & Sport Sciences*, 77, 61-71.
- Stewart, J., Gapenne, O., & Di Paolo, E. A. (2014). *Enaction: Toward a new paradigm of cognitive science*. Cambridge: MIT Press.

Influence of a new sport program on recruits' physical fitness during basic military training**Authors:** Beeler N¹, Roos L¹, Wyss T¹¹Swiss Federal Institute of Sport Magglingen SFISM, Magglingen, Switzerland**Introduction:**

Physical fitness is a crucial factor for the successful and injury-free completion of basic military training (Roos et al., 2015). The goal of the present study was to investigate whether a specific and progressive physical fitness training program instructed by Swiss Army personnel can increase the recruits' physical fitness compared to the standard army physical fitness training program.

Methods:

Two study groups participated either in the standard army physical fitness training (control group; CG) or in a newly developed sport program (intervention group; IG) during the 18 weeks of basic military training. A total duration of 180 minutes of sport related physical training per week was scheduled for the CG and 240 minutes for the IG. For the assessment of physical training content and duration, the instructors answered a questionnaire after each training session. The physical fitness of both groups was tested in weeks 2, 10 and 16 of basic military training using the fitness test battery for the recruitment of the Swiss Army (Wyss et al., 2007). This fitness test battery consists of five disciplines (progressive endurance run, seated 2-kg-shot put, standing long jump, trunk muscle strength and one-leg standing test) and results in a total fitness score ranging from 0 to 125 points. A t-test for independent samples was executed to identify group differences at each time of measurement. To analyse the changes in the total fitness score of each group, a one-way analysis of variance with a Bonferroni post-hoc test was applied. The level of significance was set at $\alpha = 0.05$.

Results:

During weeks 1 to 10 of basic military training, the CG participated in 98.59 ± 68.68 and the IG in 182.92 ± 58.27 minutes of physical fitness training per week. From weeks 11 to 16, 67.28 ± 61.69 and 98.22 ± 69.50 minutes of training per week were conducted in the CG and the IG, respectively. Seventy-one recruits (30 CG; 41 IG) completed all five disciplines of the fitness test battery at all three times of measurement. At the beginning of basic military training, the total fitness scores of the two groups (CG = 76.07 ± 16.69 ; IG = 77.12 ± 13.72 points; $p = 0.771$) were not significantly different. In weeks 10 and 16 of basic military training, the IG achieved a significantly better result than the CG (week 10: CG = 69.50 ± 14.22 ; IG = 83.24 ± 16.64 points; $p = 0.001$; week 16: CG = 64.63 ± 13.96 ; IG = 72.95 ± 14.18 points; $p = 0.016$). In the CG, the total fitness score was by trend decreased in week 10 (-8.64%; $p = 0.281$) and turned out to be significantly lower in week 16 (-15.04%; $p = 0.012$) compared to week 2. The IG by trend increased the total fitness score from weeks 2 to 10 (+7.94%; $p = 0.196$), but then significantly decreased it during weeks 10 to 16 (-12.36%; $p = 0.007$).

Discussion:

Neither the CG nor the IG achieved the scheduled duration of weekly physical fitness training, which is mainly due to the organizational framework of the Swiss Army. Nevertheless, the fitness test results from week 10 showed that with a specific physical fitness training program, the physical fitness of the recruits might be increased compared to the standard army physical fitness training program. However, the results from week 16 indicated that without continuation of a certain amount of specific training, the achieved fitness level cannot be kept or even further increased.

References:

- Roos, L., Boesch, M., Sefidan, S., Frey, F., Mäder, U., Annen, H., & Wyss, T. (2015). Adapted marching distances and physical training decrease recruits' injuries and attrition. *Military Medicine*, *180*(3), 329-336.
- Wyss, T., Marti, B., Rossi, S., Kohler, U., & Mäder, U. (2007). Assembling and verification of a fitness test battery for the recruitment of the Swiss Army and nation-wide use. *Schweizerische Zeitschrift für Sportmedizin und Sporttraumatologie*, *55*(4), 126-131.

Scapular kinematics in able-bodied, novice subjects during manual wheelchair propulsion**Authors:** Bekker JM^{1,2}, Arnet U^{1,3}, Veeger HEJ^{2,4,5}, van der Woude LHV^{6,7}¹Swiss Paraplegic Research, Nottwil, Switzerland²MOVE Institute, Amsterdam, The Netherlands³Department of Health Sciences and Health Policy, University of Lucerne, Lucerne, Switzerland⁴Free University, Amsterdam, The Netherlands⁵TU Delft, Delft, The Netherlands⁶University of Groningen, Groningen, The Netherlands⁷University Medical Centre Groningen, Groningen, The Netherlands**Introduction:**

Shoulder pain and disorders affect persons with spinal cord injury (SCI) since they are dependent on the upper extremity for mobility and activities of daily living. In earlier research, shoulder pain and functional limitations have been associated with altered scapular kinematics during discrete movements (Eriks-Hoogland, 2011; Kibler, 2012). To investigate altered kinematics in persons with SCI during manual wheelchair propulsion, a baseline of normal scapular behaviour in able-bodied persons during this task is needed. The primary aim of this study is to describe scapular kinematics in able-bodied persons during manual wheelchair propulsion.

Methods:

Sixteen able-bodied subjects with no earlier experience in manual wheelchair propulsion participated in the study. All subjects performed manual wheelchair propulsion on a motorized treadmill during three four-minute low-intensity (0.25W/kg body weight) practice blocks. Kinematic data of the upper body were collected with an optoelectric camera system and kinetic data were collected using an instrumented wheelchair wheel during all practice blocks. In accordance with the ISB guidelines, bony landmarks were probed and accordingly reconstructed. Subsequently, Euler angles of the joints of the upper body were reconstructed. Using multi-level modelling, a relationship was established between the three-dimensional movement pattern of the shoulder and upper body, anthropometrical data and the net moment around the GH joint.

Results:

During manual wheelchair propulsion the following scapularthoracic kinematics were found: during the push phase, the average protraction was 32.7 ± 7.1 degrees with a movement range of 15.6 ± 5.2 degrees, medial rotation was -7.1 ± 9.2 degrees with a movement range of 8.8 ± 7.5 degrees and anterior tilt was -9.8 ± 8.3 degrees with a movement range of 10.1 ± 4.6 degrees. In multilevel analyses, a relation between the three-dimensional movement pattern of the scapula and movement of the thorax, clavicle, humerus, and the length of the arm were established. The net moment around the GH joint did not contribute to the multilevel models. The r^2 values multilevel models ranged between 0.61 and 0.67 and the validation datasets showed good correlations between measured and predicted data.

Discussion:

The normal movement pattern of the scapula in able-bodied subjects has been described during manual wheelchair propulsion. These values provide a reference for the investigation of the scapular movement pattern in persons with SCI and possible dyskinesia related to shoulder pain. The multilevel analyses showed comparable parameters to earlier studies (Veeger, 1991). The models could aid in modelling scapular kinematics, for example in musculoskeletal modelling of the upper body, specifically in manual wheelchair propulsion where arm elevation is limited.

References:

- Eriks-Hoogland, I.E., de Groot, S. Post, M.W., & van der Woude, L.H.V. (2011). Correlation of shoulder range of motion limitations at discharge with limitations in activities and participation one year later in persons with spinal cord injury. *Journal of Rehabilitation Medicine*, 43, 210-215.
- Kibler, W. B., Sciasia, A., & Wilkes, T. (2012). Scapular Dyskinesia and its Relation to Shoulder Injury. *The Journal of the American Academy of Orthopaedic Surgeons*, 20, 364-372.
- Veeger, H. E. J., van der Helm, F. C. T., & Rozendal, R. H. (1991). Orientation of the scapula in a simulated wheelchair push. *Clinical Biomechanics*, 8, 81-90.

Cognitively engaging exergaming immediately enhances executive function and impacts heart rate variability in adolescents**Authors:** Benzing V¹, Heinks T², Conzelmann A¹, Schmidt M¹¹Institute of Sport Science, University of Bern, Switzerland²Pediatric Neuropsychology, Bern Children's University Hospital, Inselspital, Bern, Switzerland**Introduction:**

Acute physical activity (PA) is known to beneficially affect executive functions (Verburgh et al., 2013), whereas the exact modality of an activity to exert the most effects is unclear. One aspect, proposed to influence cognition and especially the executive functions is cognitive engagement comprised in acute PA (Pesce, 2012). However, research in adolescents revealed contradictory results, as only few studies examined this relationship, lacking operationalization of cognitive engagement and limited by procedural differences. The study aimed to elucidate the influence of cognitive engagement comprised in acute PA on executive functions in adolescents. In particular, the purpose was to operationalize cognitive engagement and to systematically vary the amount of cognitive engagement inherent, to determine how an activity should be constituted to exert the most positive effects on executive functions.

Methods:

In a pre-post design with three conditions, sixty-six healthy male adolescents ($M = 14.51$; $SD = 1.08$) were randomly assigned to one of three conditions: (a) high physical exerting and high cognitively engaging active video gaming (b) high physical exerting and low cognitively engaging active video gaming (c) low physical exerting and low cognitively engaging video watching. Extensive manipulation checks including subjective and objective operationalization of cognitive engagement using adapted versions of the self assessment manikin and the rating of perceived physical exertions were applied. Executive functions were assessed before and after each condition by the Design fluency test, measuring cognitive flexibility. Cardiac interbeat (RR) intervals were preprocessed and analyzed using Kubios. The root mean square of successive differences (RMSSD) was calculated.

Results:

Manipulation checks using ANOVAs for between group comparisons indicate successful experimental manipulation: Physical exertion operationalized by participants' ratings ($F(2, 63) = 53.76$, $p < .0005$, $\eta^2 = .634$) and their heart rate ($F(2, 63) = 54.73$, $p < .0005$, $\eta^2 = .638$) differed significantly between the three groups, but did not differ between the two PAs as revealed by post-hoc tests ($p > .05$). Cognitive engagement, operationalized by participants' ratings ($F(2, 63) = 5.97$, $p = .003$, $\eta^2 = .175$) and their heart rate variability ($F(2, 63) = 30.70$, $p < .0005$, $\eta^2 = .498$) differed significantly between the three conditions, with post-hoc tests showing the PA with high cognitive engagement being more cognitively demanding than the other PA ($p < .05$). ANCOVA using pre-test values as covariates and post-test values as dependent variables revealed significant differences between groups ($F(2, 63) = 3.50$, $p = .036$, $\eta^2 = .103$), with post-hoc tests showing that PA with high cognitive engagement resulted in significantly better performance in cognitive flexibility compared to the two conditions associated with low cognitive engagement ($p < .05$).

Discussion:

Regarding acute benefits for executive function in adolescents, PA with high cognitive engagement seems to be more efficient than same intensity PA with low cognitive engagement. These results extend previous research and suggest a methodological approach to subjectively and objectively measure cognitive engagement.

References:

- Pesce, C. (2012). Shifting the focus from quantitative to qualitative exercise characteristics in exercise and cognition research. *Journal of Sport and Exercise Psychology*, 34(6), 766-786.
- Verburgh, L., Konigs, M., Scherder, E. J., & Oosterlaan, J. (2013). Physical exercise and executive functions in preadolescent children, adolescents and young adults: a meta-analysis. *British Journal of Sports Medicine*, 48(12), 973-979.

Return to work after dynamic intraligamentary stabilization versus conventional ACL reconstruction**Authors:** Bieri KS^{1,2}, Scholz SM², Kohl S¹, Roeder C^{3†}, Staub LP³¹Department of Orthopaedic Surgery, Inselspital, University of Bern, Switzerland²Suva (Swiss National Accident Insurance Fund), Lucerne, Switzerland³MEM Research Centre, Institute for Evaluative Research in Medicine, University of Bern, Switzerland**Introduction:**

Surgical treatment of the ruptured anterior cruciate ligament (ACL) is often preferred in people participating in physical activities. To meet the expectations of this population, an early return to pre-injury activity level is considered as an indicator of successful treatment. Recently, the debate about the optimal treatment strategy has been re-ignited by the introduction of the dynamic intraligamentary stabilization (DIS) technique that enables the self-healing of the torn ligament (Kohl et al., 2014). DIS is restricted to the first 21 days after injury to exploit the healing potential of the ACL. In contrast, conventional ACL reconstruction (ACLR) is usually performed in a delayed timeframe. The main purpose of the present study was to compare the work incapacity between DIS and ACLR in a follow-up period of two years after injury. Further, post-operative interventions and treatment costs were compared.

Methods:

Data was acquired retrospectively from records of patients that underwent either DIS or ACLR. The inclusion criteria for this study were (i) coverage by Suva (Swiss National Accident Insurance Fund) compulsory accident insurance, (ii) traumatic ACL rupture in the years 2011 or 2012, (iii) age between 18 and 55 years, and (iv) primary rupture of the ACL. ACLR were matched to DIS on a propensity score approach among (i) age, (ii) gender, (iii) working category, (iv) date of ACL rupture, and (v) time between rupture and surgery. Work incapacity was derived from Suva accounting data on daily allowances and was expressed as the percentage of work incapacity compared with the pre-accident work capacity.

Results:

In total, 53 DIS cases and 53 ACLR cases were included. Baseline characteristics did not show any significant differences between the groups except for the mean time period from injury to surgery, which was 14 days for DIS and 50 days for ACLR ($p < 0.001$). During the first two post-operative years, work incapacity was consistently lower in DIS. Overall work incapacity was 13% for DIS and 17% for ACLR ($p = 0.03$). All patients had returned to full work capacity at the end of the follow-up. No differences in secondary arthroscopic surgeries, treatment costs and failure rates were found.

Discussion:

In DIS compared to ACLR, a significant reduction of work incapacity of 4% was observed. This corresponds to nearly one month presence at work in a full time employment. In this study, the timing of surgery is the main factor contributing to the difference in work incapacity between the groups. Reducing the time between injury and surgery decreases the period of physiological inactivity for the affected structures. When delayed, the subsequent surgery is perceived by the body as a second trauma, which requires the healing process to repeat itself. This might play a significant role in the length of the short-term recovery. The evidence presented in this study could contribute to a paradigm shift in ACL treatment towards early surgery, allowing the preservation of the torn ligament. Future long-term studies are required to determine whether the new treatment option of acute ACL injuries can be established.

References:

Kohl, S., Evangelopoulos, D. S., Kohlhof, H., Hartel, M., Bonel, H., Henle, P., von Rechenberg, B., & Egli, S. (2013) Anterior crucial ligament rupture: Self-healing through dynamic intraligamentary stabilization technique. *Knee Surgery, Sports Traumatology, Arthroscopy*, 21(3), 599-605.

Shoulder pain in individuals with spinal cord injury: Results from a community survey in Switzerland

Authors: Bossuyt FM^{1,2}, Arnet U^{1,2}, Brinkhof MWG^{1,2}, Eriks-Hoogland I³, Lay V¹, Müller R^{1,2}, Sunnåker M¹, Hinrichs T⁴

¹Swiss Paraplegic Research, Nottwil, Switzerland

²Department of Health Sciences and Health Policy, University of Lucerne, Lucerne, Switzerland

³Swiss Paraplegic Centre, Nottwil, Switzerland

⁴Division of Sports and Exercise Medicine, Department of Sport, Exercise and Health, University of Basel, Basel, Switzerland

Introduction:

Shoulder pain is a common health problem among individuals with chronic spinal cord injury (SCI) that can negatively affect mobility and consequently participation in social life (Jensen, Hoffman, & Cardenas, 2005). The aetiology of shoulder problems in persons with SCI is believed to be multifactorial including biomechanical and neuromuscular factors (Figoni, 2009). The aim of this study was twofold: (1) to determine the prevalence of shoulder pain and (2) to identify factors associated with shoulder pain (including sporting activities as well as sociodemographic and socioeconomic factors, SCI characteristics, health conditions, and mobility independence) in a nationwide survey of persons living with SCI in Switzerland.

Methods:

This study used data collected through the 2012 community survey of the Swiss Spinal Cord Injury Cohort Study (Brinkhof et al., *in press*). In total, 1549 eligible persons (Swiss residents with SCI aged 16 or older) participated (age: 52.3 ± 14.8 years; 29% female). Musculoskeletal shoulder pain over the past week (yes/no) as well as other parameters were assessed by self-report. Descriptive data analysis and multivariable logistic regression analysis were used, the latter providing adjusted odds ratios for shoulder pain for the following factors: sex, age, education, income, SCI aetiology, SCI level and completeness, spasticity, contractures, time since injury (TSI), independence in moving 10 to 100 metres, and time spent with sporting activities. The multivariable analysis was adjusted for item non-response (using multiple imputation) and unit-nonresponse (using inverse probability weighing).

Results:

The overall prevalence of shoulder pain was 35.8% (95% CI: 33.4-38.3). Multivariate regression analysis revealed higher odds of shoulder pain in females as compared to males (odds ratio; 95% CI: 1.89; 1.44-2.47) and when health conditions as spasticity (1.36; 1.00-1.85) and contractures (2.47; 1.91-3.19) were apparent. In addition, individuals with complete paraplegia (1.62; 1.13-2.32) or any tetraplegia (complete: 1.63; 1.01-2.62; incomplete: 1.82; 1.30-2.56) showed higher odds of shoulder pain as compared to those with incomplete paraplegia. Age, education, net equivalent income, etiology, and time spent with sporting activities showed no association.

Discussion:

This survey among individuals living with SCI in Switzerland revealed a high prevalence of shoulder pain. Sex, lesion characteristics, and specific health conditions were associated with having shoulder pain. Future longitudinal studies will have to search for modifiable factors that are on the causal chain (as mediators and moderators) leading to the described associations.

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Specific fatigue development during an international ice-hockey game**Authors:** Brocherie F¹, Girard O¹, Millet GP¹¹ISSUL, Institute of Sport Sciences, University of Lausanne, Switzerland**Introduction:**

While first ice-hockey time-motion studies (e.g. Green et al., 1976) provided valuable insights in our understanding of physical demands, they may not be relevant anymore today. In modern game, elite players are physically bigger and have improved their physiological fitness when compared with their predecessors (Quinney et al., 2008). Therefore, the aim of this study is to re-examine the time-motion patterns and game behaviour of elite male ice hockey players during a competitive international game with reference to the development of fatigue.

Methods:

Ten elite male ice hockey players (age: 24.4 ± 2.6 yr; height: 179 ± 5 cm; body mass: 81.8 ± 6.0 kg) were filmed during a competitive international game. Detailed activity patterns and behaviours were analysed during the three game periods.

Results:

During the game, low-intensity activities accounted for 82.4% of the total effective time and consisted of 18.8% standing, 23.0% gliding, 33.2% slow forward skating and 8.8% slow backward skating. High-intensity skating accounted for 17.6% of the total effective time and was composed of 11.7% fast forward skating, 4.9% forward sprinting and 3.4% fast backward skating and sprinting. Mean total effective playing time and effective time per shift decreased over periods (-6.8% and -8.5%, respectively), resulting in lower distance covered (-12.84%). Stoppage (+8.2%) and bench resting period (+35.6%, p<0.05) increased from period 1 to 3. The number of sprints performed in period 3 decreased compared to period 1 (-46.7%, p<0.01) and 2 (-36.6%, p<0.05). This was accompanied by a lower effective time spent in high-intensity activities (-13.5%, p<0.05), particularly in forward sprints (-54.8%, p<0.01) in period 3 vs. 1.

Discussion:

Detailed analysis of players' activity patterns of one-off international ice hockey game indicates that the capacity to perform intense actions is impeded towards the end of the game (period 3). This occurred despite the implementation of numerous shifts of players, which remained stable throughout the game. Such objective measure of performance fatigability may help practitioners to tailor sport-specific routines in order to prevent premature and/or excessive fatigue development.

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Psychophysiological responses of elite field hockey players to repeated-sprint in normobaric hypoxia**Authors:** Brocherie F¹, Millet GP¹, Girard O^{1,2}¹ISSUL, Institute of Sport Sciences, University of Lausanne, Switzerland²ASPETAR, Orthopaedic and Sports Medicine Hospital, Athlete Health and Performance Research Centre, Doha, Qatar**Introduction:**

Recently, repeated sprints in hypoxia (RSH), defined as the repetition of short (≤ 30 s) 'all-out' exercise bouts in hypoxia interspersed with incomplete recoveries, has been shown to be an effective sport-specific training method (Brocherie, Girard, et al., 2015; Brocherie, Millet, et al., 2015), providing systematic advantage compared to similar training in normoxia (RSN) to improve physical performance. While RSH does not impair mucosal immune function (Born et al. 2015), however, lesser is known about the perceptual responses to RSH. Therefore, the aim of this study was to assess the physiological strain and perceptual responses during 2 weeks of repeated sprint training in RSH vs. RSN.

Methods:

Over a 2-week period, 23 lowland elite field hockey players performed, in addition to their usual training, six sessions (four sets of five 5-s maximal sprints interspersed by 25 s of passive recovery and 5 min of rest between set) under either normobaric hypoxia ($FiO_2 \sim 14.5\%$, 3000 m) or normoxia. Physiological strain [heart rate (HR), arterial oxyhemoglobin saturation (SpO_2)], sprint times and perceptual responses [ratings of perceived exertion (RPE), overall peripheral discomfort, difficulty breathing and limb discomfort] were recorded during each RSH/RSN session.

Results:

During exercise protocol, SpO_2 remained depressed in RSH (pooled data: $91.9 \pm 1.2\%$, $P < 0.001$) vs. RSN ($96.9 \pm 0.6\%$, NS), while HR increased across sets (pooled data: 138 ± 18 , 145 ± 17 , 146 ± 14 and 147 ± 14 bpm for set 1 to 4, respectively, $p < 0.001$), independently of the conditions. SpO_2 and HR remained similar across sessions. While first sprint performance was similar between conditions, sets and sessions, last sprint performance and fatigue significantly differed across sets and sessions ($p < 0.01$ and $p < 0.05$, respectively) but not between conditions. Ratings of overall perceived discomfort, difficulty breathing and limb discomfort were higher ($p < 0.05$) in RSH vs. RSN at the first session, with a decrease across sessions ($p < 0.001$) on overall perceived discomfort and difficulty breathing, as well as on limb discomfort (interaction effect, $p < 0.05$), resulting in a lower ratings in RSH vs. RSN.

Discussion:

At the first session, the perceptual responses (RPE, overall peripheral discomfort, difficulty breathing and limb discomfort) were higher in RSH vs. RSN. As sessions progressed during the 2-wk training camp, perceived fatigability decreased in RSH, indicative of improved tolerance to the hypoxic dose.

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Effects of exercise induced trunk fatigue on trunk strength and double poling performance in junior cross-country skiers**Authors:** Bucher E¹, Roth R¹, Sandbakk Ø², Faude O¹¹Department of Sport, Exercise and Health, University of Basel, Switzerland²Department of Neuroscience, Center for Elite Sports Research, Norwegian University of Science and Technology, Trondheim, Norway**Introduction:**

The trunk segment of the body plays a crucial role in the power production during double poling (Hegge et al., 2015), one of the main sub-techniques in classical cross-country skiing. The involved muscles are working in sequential order, with the trunk and hip flexors being activated first (Holmberg, Lindinger, Stöggl, Eitzlmair, & Müller, 2005). Hip flexion velocity is associated with double poling performance (Holmberg et al., 2005) and locomotor and respiratory movements in the corresponding trunk musculature are also closely linked during this movement (Lindinger & Holmberg, 2011). Intense whole body exercise is expected to fatigue many inter-related aspects influencing performance, but the isolated effects of each component is less understood. Therefore, the aim of this study was to investigate the acute effects of fatigued trunk musculature on trunk strength and double poling performance in competitive cross-country skiers.

Methods:

16 male junior cross-country skiers (mean ± SD; age = 19.1 ± 2.6 years, body height = 177 ± 6 cm, body mass = 69 ± 7 kg, running VO_{2max} = 62.2 ± 6.9 ml/kg/min) completed two identical pre- and post-tests on separate days in a randomized, controlled cross-over design. Maximal isometric trunk flexion and extension strength tests on the IsoMed 2000 Back Module (D&R Ferstl GmbH) and a 3-min self-paced double poling test on a Concept2 Ski erg (Concept2, Morrisville, VT, USA) were performed. In between pre- and post-test, either a A) 25-min fatiguing exercise sequence targeting the ventral and dorsal core musculature, or B) 25 min rest as control condition, were applied. Power output, cycle rate, heart rate and respiratory variables were continuously measured during the double poling test. A two-way repeated measures ANOVA was performed to analyze possible interaction effects.

Results:

Isometric peak torque during trunk flexion decreased considerably from 141 ± 41 to 56 ± 20 Nm pre to post fatigue (95% CI -104 to -66 Nm; p < 0.001) and remained nearly unchanged in the control condition (mean difference: 3.6 Nm; 95% CI -1.0 to 8.1 Nm; p = 0.12). Corresponding peak torque in extension decreased from 288 ± 78 to 256 ± 80 Nm (95% CI -49 to -15 Nm; p < 0.001) and also did not relevantly change in the control condition (mean difference: -6.9 Nm; 95% CI -25 to 11 Nm; p = 0.42). Mean power output (-13%; p < 0.001), cycle rate (-10%; p < 0.001), peak oxygen uptake (-4%; p = 0.004) and peak ventilation (-7%; p < 0.001) decreased considerably from pre to post fatigue, whereas peak heart rate did not change significantly after the fatigue sequence (-1%; p = 0.098).

Discussion:

The acute fatiguing of the core musculature in junior cross-country skiers resulted in substantial decreases in trunk strength and power output during double poling. The accompanied reduction in respiratory capacity after fatigue also demonstrated the close tie between respiration and execution of the movement in double poling and possibly other whole-body endurance exercises as well.

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Lehrermotivation im Sportunterricht

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Einleitung:

Unbestritten ist heute die Bedeutung der beruflichen Kompetenz von Lehrpersonen für die Qualität des Unterrichts (z.B. Hattie, 2009). Neben kognitiven Dispositionen umfassen aktuelle Konzeptionen professioneller Lehrerkompetenzen auch motivationale und handlungsbezogene Merkmale (z.B. Weinert, 2001). Der Lehrberuf stellt eine komplexe Tätigkeit dar, die einen hohen Grad an Selbststeuerung erfordert. So sind gerade motivationale Merkmale wichtige Prädiktoren dafür, inwieweit Personen die beruflichen Anforderungen erfolgreich bewältigen. Es wird angenommen, dass für den Aspekt der motivationalen Orientierungen interindividuelle Unterschiede bei sportunterrichtenden Lehrpersonen vorliegen. Die meisten Lehrpersonen auf Volksschulstufe sind sogenannte Generalisten und so dürften gegenstands- sowie tätigkeitsbezogene motivationale Orientierungen eine wichtige Rolle spielen in Bezug auf das fachbezogene Engagement, die Weiterentwicklung der fachbezogenen Kompetenzen und auch bezüglich der Unterrichtsqualität.

Methode:

Für das Dissertationsprojekt, welches im Rahmen der Studien der Pädagogischen Hochschule St.Gallen zum „Sportunterricht in der Volksschule des Kantons St.Gallen“ bearbeitet wird, wurden Daten von 379 sportunterrichtenden Lehrpersonen ($w = 67\%$; Alter $M = 42.2$, $SD = 10.6$; KG/PS = 70%) mittels standardisierter schriftlicher Befragung im Oktober 2014 erhoben. Dabei geht es in einem ersten Schritt um eine adäquate Erfassung des Kompetenzaspekts der motivationalen Orientierungen von sportunterrichtenden Lehrpersonen sowie um die Untersuchung von Zusammenhängen dieser mit personalen und kontextuellen Faktoren sowie des Einflusses auf das professionelle Lernverhalten von Lehrpersonen im Fach Sport.

Resultate:

Die interne Konsistenz der eingesetzten Skalen zur Erfassung der motivationalen Orientierungen kann als zufriedenstellend beurteilt werden ($.61 < \alpha < .88$). Die Interkorrelationen der Konstrukte weisen plausible Ergebnisse auf, ebenso auf latenter Ebene. Zur Überprüfung der Konstruktvalidität wurden konfirmatorische Faktorenanalysen durchgeführt. Beispielsweise kann für die Wahrnehmung der „basic needs“ die dreidimensionale Faktorstruktur bestätigt werden mit entsprechender Fitstatistik (CFI = .97; RMSEA = .045). Für das Konstrukt „professionelles Lernverhalten“ erweist sich die einfaktorielle Lösung als akzeptabel (CFI = .99; RMSEA = .034). Die weiteren Analysen zeigen, dass personale (z.B. Lehrberechtigung, Berufserfahrung) wie auch kontextuelle Faktoren (z.B. vorhandene Ressourcen an der Schule) eine bedeutende Rolle spielen in Bezug auf die Ausprägung motivationaler Orientierungen von Lehrpersonen im Sportunterricht. Zudem zeigen sich positive Zusammenhänge zwischen motivationalen Orientierungen und den Dimensionen professionellen Lernverhaltens von sportunterrichtenden Lehrpersonen.

Diskussion:

Die Konstrukte im Bereich der motivationalen Orientierungen von sportunterrichtenden Lehrpersonen konnten adäquat erfasst werden und es zeigen sich Zusammenhänge mit personalen und kontextuellen Antezedenzien sowie mit dem professionellen Lernverhalten von Lehrpersonen. Weiterführend geht es um die Prüfung von Wirkungen auf Prozessmerkmale des Sportunterrichts.

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International sport federations: Drivers for and barriers to professionalization

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Introduction:

In their quest to explain professionalization in sport federations, researchers have extended the scope in recent years by adding the question of rationalization and efficiency (Chantelat, 2001) to the formerly predominant focus on occupational and organisational professionalization. International sport federations have to face new and multiple challenges in an increasingly complex environment: regulatory requirements, interdependences and stakeholder involvement, etc. These challenges result from internal as well as external factors. Nagel et al. (Nagel, Schlesinger, Bayle, & Giauque, 2015) address this question in their work on causes, forms and consequences of professionalization in sport federations. Based on their conceptual framework, three levels of analysis that shall be applied: 1) the headquarters, 2) the federation's internal level (members), 3) the external level (stakeholders from sport and society). This analysis should enable us to highlight sector-general and sport-specific moments of rupture, factors for incremental changes and significant elements of continuity. It should also enable us to assign the origin and the impact of these factors to the different levels described above. Literature on international sport federations in terms of professionalization is still rare. While some research exists on governance and organisational change at national level, no studies exist that analyse drivers for and barriers to professionalization at international or national level. Indeed, Dowling's (Mathew Dowling, Jonathon Edwards, & Marvin Washington, 2014) findings reveal that a systemic approach to the questions of governance and management in sport federations is still lacking.

Methods:

In order to locate and extract supporting evidence, an exploratory study has been carried out among representatives of umbrella organisations in sport (i.e. IOC, ASOIF) in a first phase, seeking to understand the perception of professionalization in sport federations. In a second phase, 6 international sport federations (FIH, UCI, FIVB, FISA, FISU, UWW) were selected for case studies. In total, 29 semi-structured interviews, a questionnaire, and secondary literature comprising internal documents and relevant literature supplied us with considerable data. All the data collected has been triangulated and analysed according to the conceptual framework developed by Nagel et al.

Results and Discussion:

The classification of internal and external factors shall allow us to distinguish different types of behaviour in international sport federations. A typology leaning on findings of Miles and Snow (Miles, Snow, Meyer, & Coleman, 1978) is suggested, assigning the federations' most important characteristics to four types: prospectors, defenders, reactors, and analysers. Following this typology, the relevant discussion question for future research is: Do the federations' adaptation patterns and behaviour lead to different forms?

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Qualitative and quantitative findings from a randomized controlled pilot study of exercise as an adjunct therapy in a heroin assisted treatment setting

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Introduction:

In several European countries, heroin assisted treatment (HAT) constitutes a successful therapy for opioid-addicted individuals seeking to stabilise their lives. Integrating health-promoting adjunct treatments, such as exercise (EX), may help to further improve the mental and physical wellbeing of this population (Brown et al., 2010). To date, no such programme has been trialled in this treatment setting (Zschucke, Heinz, & Strohle, 2012).

Methods:

A randomised controlled trial of an exercise programme was piloted in a HAT clinic in Switzerland. In order to develop a programme which would be attractive and feasible for patients, qualitative interviews and focus groups were carried out to establish the exercise habits and preferences of potential participants. Following recruitment to the intervention, baseline, 6-week and 12-week measures of blood pressure, hand grip strength, depression, quality of life, mental wellbeing and secondary substance consumption were collected. Finally, qualitative data on participants' experiences of the programme were gathered.

Results:

24 individuals (14 EX, 10 control) took part in 12 weeks of either twice-weekly varied exercise, or non-exercise group activities. Of these, 10 and 6 respectively took part regularly. Baseline measures showed no significant differences between the groups. Depression and mental wellbeing improved significantly amongst members of the EX group; secondary consumption, blood pressure and hand grip strength did not change significantly. Qualitative data showed that patients overwhelmingly felt that exercise would impact their lives positively, but that physical pain and social discomfort were hurdles to participation. Patients favoured a wide variety of mostly non-endurance exercise, and stressed that clear organisation and a reminder system were important. Upon completion of the programme, the EX group found the experience extremely positive, and many reported that they had surprised themselves with their abilities and would continue to exercise independently.

Discussion:

This study is the first to trial exercise in the HAT setting. Although a small sample size prohibits the overinterpretation of the positive findings regarding mental health, the patient feedback suggests that exercise is a valuable and feasible therapy modality for this population.

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Forschung ist nicht gleich Forschung. Sportwissenschaftliche Forschung im Leistungssport aus Optik Wissensmanagement

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Einleitung und Methode:

Die Nutzung von Forschungsergebnissen aus der Sportwissenschaft in der Sportpraxis, sprich deren Umsetzung auf dem Sportplatz, ist essenziell aber für alle Beteiligten eine grosse Herausforderung. In der allgemeinen Wahrnehmung scheint es selten zu Gelingen. Im Rahmen einer von Swiss Olympic in Auftrag gegebene Studie zum generellen Umgang mit Wissen im Verbundsystem Leistungssport Schweiz ist u.a. auch der Aspekt des Transfers von Information und Wissen aus der sportwissenschaftlichen Forschung in die Sportpraxis und umgekehrt analysiert worden: Mit halbstrukturierten Interviews (54x) bei einer nicht repräsentativen Auswahl von Akteuren des Schweizer Leistungssports und ergänzt mit der Sichtung von Literatur und Good-Practice aus anderen Branchen.

Resultate und Diskussion:

Der Begriff Forschung wird unterschiedlich verwendet: Die Umsetzer verstehen darunter „Entwicklung“, „Sportförderung mit wissenschaftlicher Begleitung“ oder erwarten „Innovationsvorhaben“. Für die Hochschulen ist ihre Forschung die Basis für Qualifikationsarbeiten, Produktion von Papers und der damit verbundenen Profilierung. Es ist offensichtlich, dass Erwartungen und Absichten der Beteiligten in unterschiedlichen Referenzsystemen verortet sind und dass sich diese nur mit einer «Übersetzung» logisch verbinden lassen. Dabei ist zu berücksichtigen, dass bereits die Bestimmung des Forschungsthemas, das gewählte Forschungsvorgehen und die sich anbietenden Möglichkeiten zur Verwertung der Erkenntnisse den Transfer von Wissen beeinflussen. Auch zeigen sich Mängel in der Kommunikation der wissenschaftlichen Erkenntnisse (populärwissenschaftlich, zielgruppenspezifisch, mit Perspektivenübernahme), in der zeitgerechten Vorgehensweise (Koordination, Transparenz) und der Wahl der adäquaten Umsetzungsprozesse (Ausbildung Trainer, Athleten, Eltern, Lehrmittel, Newsletter, Poster, Referat uam.).

„Lasst uns die Forschung entmystifizieren!“

Im Moment, in dem Forschung sich in den Dienst der Umsetzung, sprich der Sportförderung, stellt wird sie zur Dienstleistung. Ist es das, was man von angewandter sportwissenschaftlicher Forschung erwarten darf? Wie kommen Vorhaben zustande, die sich für Qualifikationsarbeiten eignen und gleichzeitig Nützlichkeit im Feld versprechen? Ist dies überhaupt möglich? Könnte eine eigentliche „Forschungsberatung“ im Feld vermitteln und allenfalls auch die notwendige Übersetzung der Anliegen der Praxis in eine, an die Forschung anschlussfähige, Sprache sicherstellen? Und umgekehrt? Wo haben eigentliche Innovationsvorhaben ihren Platz?

Literatur:

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Les origines clivantes du sport pour handicapés physiques en Suisse (1956-1968)

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Introduction:

Aujourd'hui, le mouvement de sport pour handicapés physique suisse est composé de deux entités institutionnelles distinctes et cela ne doit rien au hasard. Cette division trouve son origine dans les années soixante, au moment où les acteurs du mouvement suisse cherchent à institutionnaliser leurs pratiques. En 1956, *Sport-Handicap* est la première association suisse à proposer et à organiser des activités physiques et sportives pour les personnes handicapées physiques. Quelques années plus tard, en 1959, le *Groupement Suisse des Paraplégiques* (Groupe Para) de l'*Association Suisse des Paralysés et des rhumatisants* (ASPr) devient le point de ralliement des sportifs en fauteuil roulant lorsque ceux-ci ne se reconnaissent plus dans la ligne directrice proposée par la *Fédération Suisse des Invalides* (FSSI), posant alors les prémices d'une longue opposition. Nous analyserons les débuts de l'institutionnalisation du sport pour handicapés physiques en Suisse, afin de mieux saisir les raisons pour lesquelles ce mouvement sportif national est demeuré bicéphale.

Méthode:

Pour répondre à notre problématique, différentes sources ont été recueillies, analysées puis croisées: des archives écrites et des sources orales. Comme sources écrites, nous avons utilisé les archives des institutions et en particulier la presse institutionnelle de la FSSI et de l'ASPr entre 1960 et 1968. Concernant les archives fédérales de la FSSI ainsi que celles de l'Association *Sport-Handicap* Genève entre 1956 et 1968, nous avons exploité les comptes rendus des assemblées générales, les correspondances, les articles de presse et les statuts des structures. Pour les sources orales, nous avons opté pour la méthode qualitative. Nous avons effectué une série d'entretiens semi-directifs, réalisés à partir d'une trame de questions portant à la fois sur l'institution et sur les trajectoires de vie des personnes interrogées. Cette méthode permettant de reconstruire des pratiques, de mettre à jour des interactions sociales, des stratégies, et d'explorer la subjectivité des acteurs. Nous avons rencontrés trois d'entre eux, chacun impliqués dans l'une des institutions étudiées et deux athlètes ayant participé aux Jeux dès 1960.

Resultats et Discussion:

La FSSI – et ses dirigeants valides issus de l'Armée – a toujours défendu l'idée selon laquelle le sport des invalides ne doit pas être compétitif mais doit avoir pour objectif de rendre les personnes handicapées plus mobiles et plus fortes afin de faciliter leur reclassement professionnel; reflétant ici la tradition historique militaire sur le redressement des blessés de guerre (Jaccoud & Busset, 2007). *Sport-Handicap* Genève et le *Groupe Para*, composés majoritairement de civils handicapés, partent d'un postulat différent: la compétition peut être favorable à la personne handicapée. Ainsi, si celle-ci souhaite pratiquer un sport en compétition alors, il faut lui laisser cette possibilité. C'est en 1968, année des Jeux Paralympiques de Tel-Aviv, que la tension liée à cette différence de conception atteint son apogée. C'est alors la séparation du mouvement en deux entités institutionnelles distinctes. Ainsi, nous pensons que c'est l'image de ce qui doit être le sport pour les personnes handicapées (Stiker, 2013) qui va être à l'origine de la scission du mouvement. Cette image nous semble être au cœur de ce qui va amener chaque structure à faire tel ou tel choix, à défendre telle ou telle idée. Ces différences de conception étant selon nous essentiellement dues aux origines sociales et situations spécifiques des acteurs de chacune des entités (Laville & Sainsaulieu, 1997).

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Effects of marathon running on arterial stiffness in lean and obese athletes with different fitness levels

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Introduction:

Whether or not marathon running is linked to increased arterial stiffness (AST) is a matter of ongoing debate (Radtko et al., 2014; Vlachopoulos et al., 2010). The effects of body composition and fitness on AST after prolonged exercise have not been examined to date. We investigated the effects of marathon running on carotid-femoral pulse wave velocity (aPWV) in lean and obese but trained athletes with different fitness levels (individual anaerobic threshold (IAT)).

Methods:

aPWV was measured before and 2 hours after a marathon race in 15 overweight/obese (OA; BMI: 29.4 ±2.4 kg/m²; IAT: 11.2±1.0 km/h), 14 lean amateur (AA; BMI: 23.7 ±1.7 kg/m²; IAT: 12.5±1.1 km/h) and 16 lean elite athletes (EA; BMI: 22.9 ±2.1 kg/m²; IAT: 13.6±1.4 km/h) using a sphygmotonometer.

Results:

At baseline, trained obese runners did not show an increased aPWV. Two hours into the recovery from a marathon race, aPWV was significantly reduced in all participants (-0.49 m/s (confidence interval (CI):0.26, 0.72); p<0.001). However, no reduction in aPWV was apparent in trained obese athletes (8.56 (pre) vs. 8.45 (post) m/s; p=0.55) but was seen in lean AA (8.85 vs. 7.61 m/s; p<0.001) and lean EA (8.06 vs. 7.59 m/s; p=0.02).

Discussion:

Marathon running induces a reduction of AST hours into the recovery in lean marathon runners only. Although trained obese athletes presented with normal AST at baseline, failure to reduce AST after the marathon race suggests dysfunctional arterial wall properties in obese runners. Vascular response to prolonged excessive exercise depends on body composition and less on fitness levels.

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activdispens.ch – Bewegen trotz Sportdispens

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Einleitung:

„Eine völlige Freistellung vom Sport in der Krankheits-, Verletzungs- oder Behinderungsphase widerspricht in zahlreichen Fällen den heutigen Kenntnissen und Erfahrungen der Sportmedizin“ (Hebestreit et al., 2002). Trotz dieser Erkenntnis, fehlt nach wie vor ein Instrument, um differenzierte Schuldispensationen zu verordnen und den Heilungsverlauf durch angepasste Belastung in Schul- und Freizeitsport zu begünstigen. Auch wenn den Ärzten sowie den Sportlehrpersonen die Gesundheit und deren Förderung am Herzen liegen, zeigen sich in diesen beiden Berufsgruppen unterschiedliche Voraussetzungen in Bezug auf Schulsportdispensationen. Ein erstes Ziel von „activdispens.ch – Bewegen trotz Sportdispens“ war, herauszufinden, welche Voraussetzungen in Bezug auf die Sportdispensation aus ärztlicher Sicht und aus Sicht von Sportlehrpersonen erfüllt sein müssen, um vermehrt Teilzeitdispensationen auszustellen und teilzeitdispensierte Schüler aktiv in den Sportunterricht zu integrieren. Ein weiteres Ziel dieses Projektes war es, Instrumente zu entwickeln, um Kinder und Jugendliche, bei denen eine Teildispensation vom Sportunterricht möglich ist, korrekt und in angepasstem Rahmen aktiv in den Schulsport zu integrieren.

Methode:

Anhand zweier Online-Befragungen wurde eine Bedarfsanalyse bei Pädiatern, Sportmedizinerinnen, Orthopäden und Sportlehrpersonen der Schweiz erhoben. Bei den Ärzten wurde der Bedarf nach einem rasch und einfach auszufüllenden Sportdispensationsformular erfasst, bei den Sportlehrpersonen der Einbezug eines physiotherapeutisch-medizinischen Übungskatalogs zur Integration von teilzeitdispensierten Schülern in den Sportunterricht.

Resultate:

93% der Sportlehrpersonen (n = 213) sowie 51% der Ärzte (n = 87), die an der Umfrage teilnahmen, befürworteten die Möglichkeit, Teildispensationen zu verordnen und Bezug auf einen physiotherapeutisch-medizinischen Übungskatalog nehmen zu können, um diese Schülerinnen und Schüler aktiv und angemessen am Sportunterricht teilnehmen zu lassen. Auf der Grundlage der Rückmeldungen wurden ein Formular zur Dispensation vom Schulsportunterricht und ein damit verknüpfter Online-Katalog von 54 Übungen entwickelt. Alle Materialien werden über die Webseite <http://activdispens.ch/> zur Verfügung gestellt.

Nach einer ersten Pilotphase in den Kantonen BS und BL wurden Anpassungen gemacht. Momentan läuft die zweite Pilotphase in den Kantonen ZG und FR flächendeckend auf den Stufen Sek I und Sek II. Diese wird im Frühjahr 2016 ausgewertet. Weitere einzelne Gemeinden und Schulen haben das Projekt bereits übernommen.

Diskussion:

Über laufende Kontakte zu kantonalen Erziehungsdepartementen, Schularzt- und Sportämtern sowie den freien Zugang zur Projektwebseite activdispens.ch soll das Projekt schweizweit verbreitet werden. Alle erarbeiteten Unterlagen auf der Webseite activdispens.ch sind frei zugänglich. Umsetzungen und Resultate werden kontinuierlich durchgeführt und wo nötig angepasst. Zukünftig soll der Anteil der ausgestellten Teilzeitdispensationen und die Integration teilzeitdispensierter Schüler in einer weiteren Befragung erfasst werden.

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Neuromuscular and cognitive aspects of exercise training in seniors: Recent and traditional approaches of exercise-based fall prevention**Organisers:** Donath L¹, Hammes D¹, Ruffieux J², de Bruin ED³¹Department of Sport, Exercise and Health, University of Basel, Switzerland²Department of Medicine, Movement and Sport Sciences, University of Fribourg, Switzerland³Department of Health Sciences and Technology, ETH Zürich, Switzerland**Structure:**

Biological aging is accompanied by structural and functional changes that can lead to impaired cognitive and neuromuscular functioning. As a consequence, an increasing fall risk was observed. A distinctive feature of the human brain is its capacity to learn and adapt to an ever-changing environment in response to adequate daily challenges. This fact is in line with recent findings demonstrating that continued cognitive and motor learning attenuates aging-induced neurological decline and facilitates neural plasticity. Several cross-sectional and longitudinal studies elucidated mechanisms of postural control on spinal and supraspinal level. Since aging reveals deteriorations of spinal reflex activity along with reduced intra-cortical inhibition, seniors' postural control seems to rely more on higher centres. This "upward" shift might require cerebral resources for motor control in expanse of adequate cognitive function resulting in split attention when dealing simultaneously with motor and cognitive tasks (dual task paradigm). Traditional balance training and recent approaches (e.g., virtual reality training, agility-based training) might integratively challenge cognitive and motor systems eliciting improved physical function and decreased falls risks. Neuromuscular training induces remarkable plasticity with changes in brain structure, cortical and corticospinal excitability as well as spinal reflex activity that might also improve cognitive function. Cognitive impairment in seniors gradually increases up to 65% in people >85 years and dramatically affect quality of life. Available evidence suggests that physical activity and exercise can attenuate age-related cognitive decline. Effect sizes of these training studies, however, vary notably (from zero effect to large effect sizes) due to heterogeneous study designs (e.g., intervention type, outcomes, study length, participants). Most Promising exercise effects were found for executive functions primarily associated to the prefrontal cortex. The most beneficial training modality to improve brain health (e.g., endurance-, resistance-, and/or coordination based training) remains still unknown and needs to be further investigated. Traditional clinical fall preventive approaches using conventional physical training or cognitive therapy protocols comprise drawbacks when being used for long-term training, including lack of long-term motivational stimulation and lack of complex training situations that would be required to train predictive and dual-task behavior. Recent videogame-based training and agility-based training approaches might be considered as an innovative training approach that integratively tackle neuromuscular, cardiovascular and cognitive functions. It can also provide a highly motivational training setting in changing environments, which requires continuous recalibration of one's predictions of the consequences of one's own behavior and rapidly changing environments. Firstly, current knowledge on age-related differences of neural control of posture with a special focus on neural adaptations to balance training will be presented. Then, an overview of available evidence on effects of exercise on cognitive function expanded completed by own meta-analytical results with particular consideration of training-specific effects, and implications for further research will be discussed. Furthermore, latest findings on clinical benefits of long-term videogame-based training will be presented for older adults and patients with chronic diseases. This will be complemented by in-depth analyses of the mechanisms underlying these videogame-based improvements. Mirrored with traditional approaches of balance training, and integrative and multicomponent agility-based training approaches applying stop and go patterns, change in directions, eccentrics and rotations with demanding spatial orientation tasks will be introduced. In total, the proposed symposium covers neuromuscular and cognitive aspects of exercise training in seniors. Thereby, various training approaches with special emphasis on fall prevention and postural control will be discussed. The session is of high relevance for neuromuscular researchers, gerontologists and health practitioners.

Acute exposure to moderate altitude compromises standing balance performance but not spatio-temporal gait parameters after 40 minutes of light walking in young community-dwelling seniors**Authors:** du Fay de Lavallaz E^{1,2}, Drum D², Allemann R^{1,2}, Neve G^{1,2}, Donath L²¹School of Health and Human Performance, Northern Michigan University, Michigan, USA²Department of Sport, Exercise and Health, University of Basel, Basel, Switzerland**Introduction:**

Hiking at moderate altitude is a popular physical outdoor activity in seniors (Burtscher et al., 2001). Previous studies revealed that acute aerobic exercise can diminish postural control (Donath et al., 2012). It has been additionally observed that exposure to hypoxia leads to alterations of neuromuscular function (Cymerman et al., 2001). However, the effects of both altitude exposure and acute exercise on postural control have not been investigated. Thus, the present study aimed at investigating acute effects of moderate normobaric hypoxia on static and dynamic balance performance before and after a bout of 40 minutes light walking.

Methods:

Thirty-six healthy seniors (age: 62 (SD: 4) y; BMI: 25.3 (4.7) kg/m²; VO₂ at 85% HR_{max}: 30.5 (8.2) mL/kg bodyweight) were examined on three days. The first day was set to evaluate the ventilatory threshold (VT₁). Therefore, a treadmill exercise test (Pepper protocol) up to 85% of predicted HR_{max} was conducted. On day two or three, respectively, either a 40-minute treadmill walk under normobaric sea level or normobaric hypoxia conditions (2600m) at VT₁ was randomly performed. Balance performance (postural sway within 10 seconds) was assessed on a force plate during single limb-eyes opened (SLEO) and double limb-eyes closed (DLEC) stance before and after walking. Spatio-temporal gait characteristics were collected two times during the walking period (at 5' and 35') employing the Inclinomater-based RehaGait device.

Results:

Only times effects were found for selected spatio-temporal gait parameters (Cadence: $p < 0.001$, $\eta^2 = 0.29$; stride time: $p = 0.007$, $\eta^2 = 0.28$; temporal gait variability: $p = 0.01$, $\eta^2 = 0.16$) but no significant difference were found by stride length, double support and spatial gait variability. Heart rate and Borg revealed a significant change over time ($p < 0.001$, $\eta^2 = 0.42$ and $p < 0.001$, $\eta^2 = 0.46$). A moderate time x condition effect was only observed for postural sway during single leg standing with opened eyes ($p = 0.04$, $\eta^2 = 0.11$).

Discussion:

A deterioration of cadence, stride time, temporal gait variability was found. This finding might be attributed to fatigue-induced changes of temporal adjustments of gait patterns. Moderate altitude did not additionally affect gait. Interestingly, altitude revealed additional deteriorations of postural sway during single limb standing. Thus, we assume that severe postural tasks that require central adjustments might sensitively respond to moderate exposure to altitude.

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Long-term physical activity is associated with reduced arterial stiffness in older adults: Longitudinal results of the SAPALDIA cohort study

Authors: Endes S¹, Schaffner E^{2,3}, Caviezel S^{2,3}, Dratva J^{2,3}, Autenrieth CS^{2,3}, Wanner M⁴, Martin B⁴, Stolz D⁵, Pons M⁶, Turk A⁷, Bettschart R⁸, Schindler C^{2,3}, Künzli N^{2,3}, Probst-Hensch N^{2,3}, Schmidt-Trucksäss A¹

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Introduction:

Physical activity (PA) is one of the main lifestyle modifiers associated with decreased cardiovascular risk (Mancia et al., 2013). Cardiovascular diseases are closely related to arterial stiffness, wherefore arterial stiffness is an easily applicable independent predictor of cardiovascular risk (Laurent et al., 2006). Longitudinal analyses PA and cardiovascular disease risk in terms of arterial stiffness in populations of older adults are scarce. We examined associations between long-term change of PA and arterial stiffness in the Swiss Cohort Study on Air Pollution and Lung and Heart Diseases in Adults (SAPALDIA).

Methods:

We assessed PA in SAPALDIA 2 (2001-2003) and SAPALDIA 3 (2010-2011) using a short questionnaire asking for the duration and frequency of PAs per week. In line with current PA guidelines we used a cut-off of at least 150 minutes of moderate-to-vigorous PA per week for sufficient PA. Arterial stiffness was measured oscillometrically by means of the brachial-ankle pulse wave velocity (baPWV) in SAPALDIA 3 using a VaSera 1500N vascular screening system (Fukuda Denshi, Japan). We used multivariable mixed linear regression models adjusted for several potential confounders in 2605 persons aged 50-81 years.

Results:

Adjusted means of baPWV were significantly lower in persons with sufficient moderate-to-vigorous PA a) in SAPALDIA 2 but not SAPALDIA 3 (P=0.048) and b) in both surveys (P=0.001) when compared to persons with insufficient activity in both surveys. There was a significant interaction between sex and the level of change in PA concerning baPWV (P=0.03). The triples of parameter estimates describing the association between level of PA change and baPWV were not significantly different between the two sex-specific models (P=0.07).

Discussion:

Keeping up or adopting a physically active lifestyle was associated with lower arterial stiffness in older adults after a follow-up of almost a decade. Increasing the proportion of older adults adhering to PA recommendations incorporating also vigorous PA may have a considerable impact on vascular health at older age and may contribute to healthy ageing in general.

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Effekte von Kompressionskleidung auf Leistung und Regeneration bei Langstreckenläufern – Eine systematische Übersichtsarbeit**Autor/innen:** Engel F¹, Altmann S²¹Forschungszentrum für den Schulsport und den Sport von Kindern und Jugendlichen, Karlsruher Institut für Technologie, Karlsruhe, Deutschland²Institut für Sport und Sportwissenschaft, Karlsruher Institut für Technologie, Karlsruhe, Deutschland**Einleitung:**

Kompressionsbekleidung wird von der Sportartikelindustrie aktiv vermarktet. Dies führt dazu, dass Läufer in unterschiedlichen Leistungsklassen Kompressionsbekleidung tragen, mit dem Ziel ihre Leistung und Regeneration zu verbessern.

Methoden:

Ziel ist die Bewertung der Effekte von Kompressionsbekleidung auf Leistung und Regeneration im Langstreckenlauf in *original research*-Studien. Eine computerbasierte Literaturrecherche in den elektronischen Datenbanken PubMed, MEDLINE, SPORTDiscus und Web of Science wurde im September 2015 durchgeführt. Relevante Artikel, veröffentlicht in *peer-reviewed journals*, welche Effekte auf physiologische, psychologische und/oder biomechanische Parameter während oder nach Laufbelastungen analysierten, wurden inkludiert. Für die Mittelwerte und Standardabweichungen der Auswirkungen der Kompressionsbekleidung wurde die *Hedges' g*-Effektstärke und das 95%-Konfidenzintervall für den Vergleich der Experimental- (Kompression) und Kontrollgruppe (keine Kompression) berechnet.

Resultate:

32 Studien mit insgesamt 494 Probanden entsprachen den Einschlusskriterien und wurden detailliert analysiert. Die eingesetzte Kompressionsbekleidung bestand aus kniehohen Socken (n = 17), Tights (n = 10), kniehohen Stulpen (n = 4), Shorts (n = 3) und Ganzkörperkompressionskleidung (n = 1). 16 Studien wurden mit Elite- oder gut trainierten Athleten durchgeführt, 13 mit Freizeitathleten und 3 mit untrainierten Probanden. Die Kompressionsbekleidung bewirkte keine statistisch signifikanten Effekte auf die Laufleistung im (Halb-)Marathon, Trailrun sowie bei 5- und 10-km-Läufen (mean $g = 0.03 \pm 0.15$). Die *time to exhaustion* in Stufentests und Läufen bis zur Erschöpfung auf dem Laufband zeigte in 7 Studien kleine positive Effekte (mean $g = 0.27 \pm 0.33$) und in 3 Studien moderate bis große Effekte (mean $g = 0.57 \pm 0.24$) bei Anwendung der Kompressionsbekleidung. Keine Effekte zeigten sich hinsichtlich der physiologischen Parameter maximale und submaximale Sauerstoffaufnahme, Blutlaktatkonzentration, Blutgaskinetik oder kardialen Parameter ($g = -0.04$ – -0.05). Die Laufökonomie (mean $g = 0.21 \pm 0.38$), die Laktatelimination (mean $g = 0.29 \pm 0.32$), das subjektive Belastungsempfinden (mean $g = 0.28 \pm 0.38$) und die Entzündungsmarker (mean $g = 0.24 \pm 0.44$) sowie die Kreatinkinase (mean $g = 0.11 \pm 0.47$) zeigten jeweils kleine positive Effektstärken. Große Effektstärken wurden für das subjektive Schmerzempfinden in der Regenerationsphase (mean $g = 0.67 \pm 1.06$) berechnet.

Diskussion:

Die vorliegenden Ergebnisse zeigen, dass unterschiedliche Kompressionsbekleidungen für Läufer einen kleinen positiven Einfluss auf die Ausdauerleistung bei bestimmten Belastungsformen (z. B. *time to exhaustion*) aufgrund von Verbesserungen von Laufökonomie und subjektivem Belastungsempfinden haben können. Der wesentlichste Vorteil von Kompressionsbekleidungen liegt jedoch in der Anwendung während der Regenerationsphase, in welcher sie Entzündungsmarker, Kreatinkinase und Muskelschmerzen in der Arbeitsmuskulatur aufgrund von erhöhter Blutflussgeschwindigkeit, verbessertem venösem Rückfluss und Reduktion von Ödemen wirksam minimieren können.

Balancieren im Traum: Auswirkung von Wii-Balance-Board-Spielen auf Traum inhalte**Autoren:** Erlacher D¹, Nefjodov I¹, Winkler A¹Institut für Sportwissenschaft, Universität Bern, Schweiz**Einleitung:**

Die Kontinuitätshypothese aus der Traumforschung geht davon aus, dass sich das Wachleben im Traum in der einen oder anderen Art widerspiegelt (z.B. Trennung, Stress; Überblick: Schredl, 2003). Des Weiteren scheint der REM-Schlaf eine Rolle bei der Gedächtniskonsolidierung zu spielen (vgl. Plihal & Born, 1997). Da im REM-Schlaf ebenfalls intensiv geträumt wird, stellt sich die Frage, ob sich die Konsolidierungsvorgänge in den Träumen wiederfinden. De Koninck u. a. (1996) konnten in einer Pilotstudie zeigen, dass Personen, die von der zu lernenden Aufgabe träumten, tatsächlich am nächsten Morgen bessere Leistungen zeigten. In einer eigenen Studie (Schredl & Erlacher, 2010) konnten die Befunde für REM-Träume jedoch nicht bestätigt werden, wobei die Versuchsteilnehmer für eine Stunde eine Spiegelzeichnen-Aufgabe üben mussten. Auffällig war die niedrige Inkorporationsrate in dieser Studie, ein Hinweis dafür, dass die Lernaufgabe im Gegensatz zu anderen Untersuchungen nicht so intensiv (Dauer und Art der Aufgabe) war. Deshalb soll in dieser Studie die Auswirkung von einem zweistündigen Training einer großmotorischen Aufgabe sowohl auf die Traum inhalte als auch auf die Konsolidierungseffekte untersucht werden.

Methode:

Insgesamt nahmen 13 Studierende (4 Frauen, 9 Männer; Alter: M = 26.9 Jahre) an der Untersuchung teil und verbrachten eine Nacht im Schlaflabor. Um 20 Uhr wurde ein zweistündiges Trainingsprogramm auf dem Wii-Balance Board (Nintendo) mit verschiedenen Balance-Spielen durchgeführt. Alle Teilnehmer hatten zuvor keine Erfahrung mit diesem Gerät und am Ende des Trainings erfolgte ein Test. Anschließend wurden die Versuchsteilnehmer für die Schlafmessung verkabelt und um 23 Uhr wurde das Licht gelöscht. Während der Nacht wurden die Teilnehmer ab der zweiten REM-Phase nach einem standardisierten Protokoll aus REM-Schlaf geweckt (2-4 Weckungen pro Teilnehmer; gesamt 40 REM-Weckungen) und nach ihren Träumen befragt (n = 36; 90% Traumerinnerung). Am Morgen darauf durchliefen die Probanden einen zweiten Test.

Resultate:

In 2 der 36 Träume berichten die Teilnehmer von der Wii-Konsole geträumt zu haben, in 7 wurden Gleichgewichtsbezogen Themen genannt. Der Vergleich der Testwerte vom Abend zum Morgen ergab keine statistisch signifikanten Unterschiede.

Diskussion:

Wie in der Studie von Schredl und Erlacher (2010) zeigte sich auch hier eine niedrige Inkorporationsrate (25%); im Vergleich gab es in 47% der Träume eine Schlaflaborreferenz. Ebenfalls zeigten sich keine eindeutigen Konsolidierungseffekte durch die Traum inhalte. Zusammenfassend klingt die Vorstellung, dass sich der Konsolidierungsprozess in den Traum inhalten widerspiegelt und durch die kognitive Simulation der Bewegungsausführung die Handlungen im Wachen festigt, verlockend, die bisherigen Ergebnisse können diese Annahme jedoch nicht eindeutig bestätigen, so dass weitere Untersuchungen abgewartet werden sollten.

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Effect of normobaric hypoxic walking training on mechanics and energetics of gait in obese adults**Authors:** Fernández Menéndez A¹, Saudan G¹, Hans D², Saubade M³, Millet G¹, Malatesta D¹¹Institute of Sport Sciences (ISSUL), University of Lausanne, Switzerland²Center for Bone Diseases³Swiss Olympic Sports Medicine Center, Lausanne University Hospital, Switzerland**Introduction:**

Recent studies have reported a higher absolute and relative value of the Net Energy Cost of Walking (NetCw) (Browning et al., 2005) and slower preferred walking speed (PWS; Malatesta et al., 2009) in obese compared with normal weight subjects. This extra-cost of walking can be reduced with a decrease in body mass or changes in the biomechanical parameters. In obese individuals, normobaric hypoxic training induced similar improvements than normoxic training but using lower intensity (Wiesner et al., 2008). However, the efficacy of this type of training has never been investigated in obese adults. The purpose of this study was to investigate the changes in mechanics and energetics of walking after a normobaric hypoxic training.

Methods:

Subjects: n = 12 (2 Men, 10 Women; age: 33.9±4.7 yr; BMI: 34.2 ± 2.7 kg/m²). - PreTest: 1) body mass and composition (DEXA); 2) blood samples [total cholesterol (TC), high-density lipoprotein (HDL), low-density lipoprotein (LDL), triglycerides (TG), plasma glucose, insulin concentrations and insulin resistance (HOMA-IR)]; 3) NetCw (OxyconPro, Jaeger) and mechanics of walking (HP-Cosmos 150MED, Aarsalis; BTS Bioengineering) were calculated for speeds from 2 to 6 Km/h and at PWS. - Training program: 9 walking training sessions (60 min) at PWS in normobaric hypoxic conditions (3000 m) in single-blind fashion. - PostTest: Idem PreTest.

Results:

There is a significant difference in Net Cw at 6 Km/h (p=0.005). The Total Work remains unchanged, however, there is a significant difference in the Efficiency at 6 Km/h (p=0.022). There is also a tendency in the increase in the Preferred walking speed (p=0.055). No significant difference in the biomechanical parameters between pre- and post training (p>0.05). Total body mass tended to be lower (Pre: 96.8±9.4 kg, Post: 96.3±9.8 kg; p=0.08) with a tendency in the reduction in fat mass of the lower limbs (p=0.084). HDL concentration significantly decreased (Pre: 1.4±0.4 mmol/l, Post: 1.3±0.4 mmol/l; p=0.02) and LDL, glucose and TG concentrations tended to be lower in post- compared to pre-training (p<0.1). There was no significant difference in HOMA-IR between pre- (3.1 ±1.7) and post training (3.3 ±2.0; p=0.761).

Discussion:

The training under hypoxic conditions did not imply major alterations in the biomechanics of walking in obese subjects. The lack of differences in Wtot, along with a significant decreased of NetCw, led to a significant increase in the mechanical efficiency at the highest speed. PWS tended to be increased after the training, attesting the efficacy of the program. Our results revealed a tendency to decrease in the total body mass probably due to a reduction in the lower limbs fat mass after the intervention. However, the second part of the study in normoxia conditions is needed to know whether these changes were due to the training *per se* (Gatterer et al., 2015) or to the hypoxic conditions.

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Prevalence of vitamin D deficiency in Swiss elite wheelchair athletes**Authors:** Flueck JL^{1,2}, Hartmann K¹, Perret C¹, Strupler M¹¹Institute of Sports Medicine, Swiss Paraplegic Centre Nottwil, Switzerland;²Zurich Center for Integrative Human Physiology, imMed PhD Program, University of Zurich, Switzerland**Introduction:**

In the past few years, the interest on Vitamin D increased continuously and physicians are advised to check the Vitamin D status in athletes regularly during the year to prevent Vitamin D deficiency. In the winter months, the sunlight in the northern European countries doesn't have enough power to synthesize Vitamin D. Therefore, an increasing number of able-bodied athletes showed Vitamin D deficiency during this time of the year. Symptoms of Vitamin D deficiency in athletic populations are still unclear. However, impaired muscle function, reduced regenerative capacity, impaired immune function, poor bone health and even impaired cardiovascular function have all been associated with low Vitamin D status in athletes (Owens et al., 2015). The aim of this study was to investigate the Vitamin D status in Swiss elite wheelchair athletes during the year to detect potential deficiency in this population group and to develop recommendations for elite wheelchair athletes.

Methods:

164 blood samples from 72 Swiss wheelchair athletes (mean \pm SD: age 32 \pm 13y) were analyzed for Vitamin D status. All participants were members of the National team in their discipline. The following disciplines have been included: rugby, athletics, cycling, tennis, ski alpine, curling and basketball. Total serum 25[OH]D was analyzed in an external laboratory. According to the general guidelines the level of deficiency was set to <75nmol/L, whereas high deficiency was defined as <50nmol/L and severe deficiency as <27.5nmol/L.

Results:

120 samples (73.2%) showed a insufficiency or deficiency with a concentration below 75nmol/L. From November to April the results showed a higher occurrence of deficiency compared to summer months (May to Oct). Indoor athletes showed significantly lower vitamin D levels during winter as well as during summer months ($p < 0.05$). Furthermore, comparing gender, impairment extent and lesion level, no significant difference was found ($p > 0.05$). During winter months, only 16.3% of all samples showed sufficient vitamin D levels. In contrast, during summer 38.5% of the samples were classified as non-deficient. Severe deficiency occurred during winter in 12.8% of all cases whereas during summer only 1.3% suffered from a severe deficiency.

Discussion:

We found a relative high (73.2%) Vitamin D deficiency in Swiss elite wheelchair athletes. Athletes suffered in a higher extent from vitamin D insufficiency and deficiency during winter months compared to summer. Furthermore, indoor athletes showed a higher mean of 25[OH]D compared to outdoor athletes, which was due to less sun exposure when staying indoors. Comparing different impairment levels (para- vs. tetraplegia) and different impairment extents (complete vs. incomplete) no significant differences in vitamin D levels were found. This might be explained by the fact that our participants were all training and moving a lot and were not immobile or bedrest patients. Conclusively, we recommend the supplementation of Vitamin D - especially during the winter months - to prevent a deficiency and an impairment in exercise performance.

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Soccer injuries in Switzerland – A retrospective survey

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Introduction:

According to the study „Sport Schweiz 2014“ soccer is the most popular team sport in Switzerland (Lamprecht et al., 2014). As a result, 45,000 soccer related injuries are counted annually considering non-occupational accidents of working people only (KSUV, 2015). This leads to direct costs amounting to CHF 180 million. In summary, it can be said that soccer injuries are not only financially significant but also constitute an important public health issue. However, there are few studies providing an overview of nationwide injury events and they include limited information with respect to the setting of injury and the injury situation. This results in incomplete knowledge about the context and characteristics of soccer injuries, which could provide information may be essential for further improvements in prevention.

Methods:

This retrospective survey was supported by Suva which reports 30'000 soccer injuries annually (KSUV, 2015). Out of these, 2835 were randomly selected and 822 persons were interviewed. The standardised telephone survey took 16 minutes on average. To participate in the study the insured persons had to be able to communicate in either German or French while the Italian-speaking part of Switzerland was not included. After an extensive data screening 708 interviews were considered valid and included in the analysis.

Results:

Out of all injuries 70% happened during formal soccer play (49% games, 21% training) and 30% during informal soccer play. 53% of all soccer injuries were caused by contact with an opponent and 37% were self-inflicted (10% other). Additionally, a more detailed classification of injury situations was carried out based on short statements regarding the course of events. The most frequent injury situations were being tackled (16%), collisions (15%), and other contact situations (10%) followed by twisting/turning (8%). We found 6% mild injuries (absence <7 days), 33% moderate injuries (8-28 days) and 61% severe injuries (>1 month). As verified by executing different multivariate analyses the severity of an injury was influenced by different factors. There was a notably higher rate of severe injuries to the knee (81%, $p \leq 0.001$) and to cartilage and meniscal damages (92%, $p \leq 0.001$). Age, injury situation and league were additional factors influencing severity of injury whereas foul plays did not lead to more severe injuries. We could show that persons aged 15 to 24 were injured less seriously than the 25-34 year olds ($p \leq 0.001$) and the 35-44 year olds ($p \leq 0.001$). In games of 30+/40+ leagues (89%, $p = 0.005$) there were higher rates of severe injuries. Moreover, we found a high rate of severe injuries when an accident occurred during twisting/turning (79%, $p = 0.003$).

Discussion:

About one third of soccer injuries occur during informal soccer play. Therefore, injury prevention should not only be focussed on formal soccer. All in all, mild injuries are underrated in this survey because Suva only records accidents that actually cause costs. As far as the prevention of severe injuries is concerned, those to the knee are of great significance. Furthermore, players of 30+ and 40+ leagues constitute an interesting target group. Another remarkable finding of this survey is that injuries generally occur more frequently in contact situations (being tackled, collisions, other contact) than being self-inflicted. However, severe injuries are more often a result of specific playing situations without direct contact to an opponent such as twisting/turning.

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Cardiorespiratory fitness moderates the relationship between perceived stress and cardiovascular risk factors**Authors:** Gerber M¹, Börjesson M², Ljung T³, Lindwall M², Jonsdottir IH^{2,4}¹Department of Sport, Exercise and Health, University of Basel, Switzerland²Department of Food and Nutrition, and Sport Science, University of Gothenburg, Sweden³Department of Health Science, Mid-Sweden University, Sweden⁴Institute of Stress Medicine, Gothenburg, Sweden**Introduction:**

Cardiovascular diseases (CVD) are still the most frequent cause of mortality in developed countries (Park et al., 2015). Strong epidemiological evidence exists that psychosocial stress plays an important part in the development of CVD and strongly impacts the prognosis of cardiac patients (Steptoe & Kivimäki, 2012). Although cardiorespiratory fitness has been associated with decreased morbidity and mortality in epidemiological research in both men and women (Kodama et al., 2009), research examining CRF as a potential buffer of stress-related cardiometabolic risk or CVD is extremely sparse (Holtermann et al., 2010; Yin, Davis, Moore, & Treiber, 2005). Therefore, the purpose of the present study is to find out how CRF and self-perceived stress are associated with eight cardiometabolic risk factors, and to determine if participants' CRF levels moderate the relationship between stress and cardiometabolic risk.

Methods:

A gender-matched stratified sample (N=197, 51% men, mean age=39.2 years) was used to ensure that participants with varying stress levels were equally represented. CRF was assessed with the Åstrand bicycle test. Systolic (SBP) and diastolic blood pressure (DBP), body mass index (BMI), total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), triglycerides (TG), and glycated hemoglobin (HbA1c) were assessed as indicators of cardiometabolic risk.

Results:

Higher LDL-C and TG concentrations were found in participants with elevated stress scores. Lower SBP, DBP, BMI, LDL-C and TG values were observed in participants with high CRF. Participants with elevated stress who also had high CRF levels had lower SBP, DBP, LDL-C, and TG values than participants with elevated stress, but low or moderate CRF levels.

Discussion:

Better CRF is associated with decreased cardiometabolic risk, particularly if participants perceive high psychosocial stress. Although low CRF is a major risk factor of cardiovascular events, CRF is currently the only marker that is not routinely assessed in primary care and clinical settings. Promoting and measuring CRF can help motivating people to adopt a more physically active lifestyle and provide some protection against the health hazards associated with high chronic stress perceptions.

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Analysis of collective activity in soccer: Interpersonal coordination and shared understanding**Author:** Gesbert V¹¹Institute of Sport Sciences (ISSUL), Lausanne, Switzerland**Introduction:**

Who has never heard the story of teammates in the environment of team sports who are high skilled individually and yet inefficient to obtain expected results? Although there are various reasons to explain the origins of this team's (in)effectiveness, interpersonal coordination describing of the articulation of individual actions in time and in space is usually considered as one of its key processes. Studies currently underway in sport sciences aim to understand the cognitive factors which lead to the success of interpersonal coordination (Sève et al., 2009). To coordinate their actions, team members need to develop a shared understanding of the unfolding situation. In return, shared understanding promotes the development of shared expectations that enable the carrying out of coordinated and compatible behaviors between teammates. However, there is a debate in the scientific literature about the necessity of getting shared understanding to coordinate with each others which influences practical implications. Linked with this reflection, our study has aimed to characterize the cognitive factors which promote coordination between high-level soccer team players in the course of offensive transition situations.

Methods:

This study was carried out in collaboration with the performance department of the Stade Rennais Football Club. We collaborated with the U19 National Team. Fifteen players volunteered to take part in this study (M= 17,4 years; SD = 0.3 months). Three types of data were collected: (a) ethnographic notes, (b) continuous video recordings of the players' behaviors during eleven championship matches, allowing the extraction of offensive transition situations, (c) verbalization data from elicitation interviews (e.g, Mouchet, Vermersch & Bouthier, 2011) which allowed for an understanding of the lived experience by each player during the realization of eight offensive transition situations. Then, we compared the soccer player's lived experience in order to describe the relation between the players' objectives during the situation and to characterize the shared contextual information.

Results:

The results indicated that players in order to gain the ball have individual and specific objectives according to their position on the pitch. In contrast, the results highlighted an evolution of the players' objectives at the moment where the team gained the ball, then during the attack on the opposing goal. We defined this evolution as a "switch" characterized through the sharing of the same objective between the carrier of the ball and one of his teammates and the momentary disconnect of other teammates at the level of their significant activity.

Discussion:

Our results indicated that to gain the possession of the ball, each player has a specific area of understanding according to their position on the pitch. Team functioning was ensured by the compatibility of these various areas of individual understanding: shared understanding is therefore distributed among the players. From the moment of the recovery of the ball, our results showed a change at the level of these interpersonal interactions. The carrier of the ball and one of his teammates (generally one in his field of vision) usually shared the same objective whereas the other player was systematically „disconnected“. This result highlights the fact that several areas of understanding may emerge in the same team. Our results showed therefore that the coordination of the players' activities during the carrying out of offensive transition situations were based on various forms of shared understanding.

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Rapid muscle torque production following repeated treadmill sprints at different levels of normobaric hypoxia**Authors:** Girard O¹, Brocherie F¹, Millet GP¹¹ISSUL, Lausanne University, Switzerland**Introduction:**

When assessing neuromuscular function, measuring only maximal torque production may underestimate the functional impairment of fatigued muscles. Explosive muscle strength can comprehensively (*i.e.*, over different intervals along the torque-time curve) be analyzed from exploration of muscle torque characteristics during isometric contractions (Aagaard et al., 2002). Compelling evidences report larger performance decrement during hypoxic vs. normoxic repeated sprinting, yet the neuromuscular adjustments have not been thoroughly investigated. We assessed changes in rapid muscle torque production capacity and neuromuscular activity of knee extensors in response to repeated treadmill sprints at different levels of normobaric hypoxia.

Methods:

Thirteen team-sport athletes performed eight, 5-s sprints with 25-s of passive recovery on an instrumented treadmill in either normoxia near sea-level (SL; F_iO₂ = 20.9%), moderate (MH; F_iO₂ = 16.8%; corresponding to ~1800 m simulated altitude) or severe normobaric hypoxia (SH; F_iO₂ = 13.3%; ~3600 m). Maximal explosive torque (*i.e.*, with instructions of “hardest and fastest”) and electromyographic (EMG) activity of the *vastus lateralis* (VL) and *rectus femoris* (RF) muscles were measured during brief (5 s) maximal voluntary isometric contractions (MVC) of the knee extensors before and immediately after repeated sprinting. Rate of torque development (RTD) and EMG (*i.e.*, Root Mean Square; RMS) rise were recorded at time intervals of 0-30, 0-50, 0-100 and 0-200 ms relative to torque onset, and were also normalized to maximal torque and EMG values, respectively.

Results:

Compared to SL (-5.3±1.9% and 183.2±9.3 m), a larger ($p<0.05$) sprint decrement score and a shorter ($p<0.05$) cumulated distance covered over the eight sprints occurred in SH (-8.2±3.9% and 178.5±10.7 m) but not in MH (-7.2±3.5% and 181.4±10.3 m), with no difference between SL and MH. Compared to SL (-9±7%), a larger ($p<0.05$) reduction in the MVC torque occurred post-exercise in SH (-14±9%), but not in MH (-12±7%), compared with pre-exercise values. Irrespectively of condition ($p>0.05$), peak RTD (-6±11%; $p<0.05$) and normalized peak RMS activity for VL (-8±11%; $p=0.07$) and RF (-14±11%; $p<0.01$) muscles were reduced after repeated sprinting, whereas reduction in RTD occurred within the 0-100 (-8±9%) and 0-200 ms (-10±8%) epochs after contraction onset. No differences in RTD values were observed after normalisation to MVC torque ($p>0.197$). Furthermore, the rate of EMG rise for VL muscle was unaffected ($p>0.120$), whereas it increased ($p<0.05$) for RF muscle during all epochs post-exercise, independent of the conditions.

Discussion:

Alteration in repeated-sprint ability under severe hypoxia is greater than at sea level or moderate hypoxia. In the knee extensors, peak and late phase contractile RTD decreased post-exercise, independent of condition. However, contractile RTD were not different after normalisation to MVC torque, indicating that post-exercise strength losses accounted for the decrease in RTD. In line with similar trends observed after playing tennis (Girard et al., 2014) in hot environments, no changes in the rates of VL muscle activation were found. The fact that RF RMS activity increased is an interesting observation. In summary, normobaric hypoxia exposure has no additional influence on fatigue-related changes in rapid muscle torque production following repeated sprinting.

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Mechanical alterations during a 800-m self-paced run**Authors:** Girard O¹, Millet GP¹, Micallef JP²¹ISSUL, Lausanne University, Switzerland²Movement to Health M2H, Montpellier-1 University, EuroMov, France**Introduction:**

This study investigated continuous changes in running kinematics, kinetics and spring-mass characteristics during a 800-m self-paced run.

Methods:

On a 200 m indoor tartan track, 18 trained football players (21.2±2.8 years; 178.2±3.6 cm; 70.4±6.6 kg) performed a 800-m self-paced run (mean performance ~156.5±7.5 s; 17.6±1.3 km.h⁻¹). Once per lap, vertical ground reaction forces (GRF) were measured (sampling frequency: 500 Hz) by a 5 m-long force platform system (KI 9067, Kistler, Switzerland) integrated into the track from which two consecutive steps (one stride) were extracted for analysis. GRFs were then used for determining stride parameters (contact time, stride length and frequency) and calculating spring-mass model characteristics (leg and vertical stiffness). Running speed was measured by means of a radar Stalker ATS System.

Results:

After a fast start (19.4±1.8 km.h⁻¹) velocity progressively decreased at 300 m, 500 m and finally levelled-off at 700 m marks (-5.7±4.6%, -10.4±8.3%, and -9.1±13.5%; p<0.001). Stride length (-8.5±2.3%, p<0.01) and, to a lower extent, frequency (-1.0±1.5%, p=0.05) decreased from 100 m to 700 m. Contact (+10.7±3.1%, p<0.001) and swing times (+4.6±2.0%, p<0.05) together with push-off phase duration (+20.0±5.7%, p<0.001) lengthened at similar distance marks, while flight time (-8.5±1.9%, p<0.001) decreased resulting in unchanged total stride duration. Peak braking (-7.5±4.4%, p<0.05) and push-off forces (-5.1±7.2%, p<0.05) decreased, while mean loading rate changes from 100 m (20.7±6.4 N.m⁻¹) to 700 m (19.1±4.4 N.m⁻¹) were not significant (p>0.05). Peak vertical forces (-3.0±2.7%; p>0.05) and leg compression (+2.8±3.9%; p>0.05) remained unchanged, whereas centre of mass vertical displacement (+24.0±7.0%; p<0.001) increased during the run. As a result, vertical stiffness decreased (-18.1±4.4%; p<0.001), whereas leg stiffness was unchanged (-3.2±4.6%; p>0.05).

Discussion:

During a 800-m time trial, athletes progressively decreased their running velocities over the major part of the run. It confirms the very specific pacing strategy (e.g. prolonged deceleration) over 800 m, different to other middle-distance events (e.g. with a final burst; Tucker et al., 2006) and is different to the one observed in trained triathletes during a 5 km self-paced run (Girard et al., 2013). One may argue that the magnitude and timing of leg muscles' contraction was continuously adjusted during the race based on muscular and/or neural factors (Nummela et al., 2008), affecting stiffness regulation (*i.e.*, decreased vertical stiffness) and then force production characteristics. Future studies should evaluate the effect of different pacing strategies upon performance of the 800 m (*i.e.*, first 200 m pace set at a lower and higher percentage of the reference pace) and evaluate which strategy presents the less unfavourable modifications of running mechanics.

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Repeated sprint fatigue in team sports

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Although the importance of repeated-sprint ability (RSA) as a crucial physical component of team-sport performance has been recently questioned, fatigue development in team sports (e.g. soccer) has been linked with the ability to reproduce sprints (Girard et al., 2011). For instance, fatigue manifests during RSA test as a decline in maximal sprint speed (i.e. running) over sprint repetitions. Various ergogenic aids (e.g. creatine, caffeine, hypoxia and heat acclimatization) provide a various means to experimentally assess possible determinants of fatigue during RSA test. Such information may assist in the design of training programs to delay the onset of fatigue and thus improve RSA in team sport athletes. Fatigue during RSA test appears to be a multi-factorial process that can be attributed to both “central” (i.e. failure to fully activate the contracting musculature and/or changes in inter-muscle recruitment strategies) and “peripheral” (i.e. limitations in energy supply, accumulation of metabolic-by-products) mechanisms. Other factors such as stiffness regulation, muscle damage and hostile environments (e.g. heat, hypoxia) are also likely to compromise fatigue resistance during RSA test. The complex nature of fatigue is highlighted by the diversity of indices (e.g. percentage decrement score as the most valid and reliable method of eight different approaches) that have been used to account for the decline in muscular performance. Because these various indices have been associated with initial sprint performance, caution is requested when interpreting fatigue scores, especially when assessing the effects of ergogenic aids. Based on this, there is no doubt that, during RSA test, the magnitude of fatigue development is “task-dependent” and potentially influences the above mentioned underlying mechanisms. For example, fatigue resistance during RSA test depends on the number of repetitions and duration of the effort periods, and the recovery pattern (i.e. the nature, duration and intensity of the recovery between sprints). Altogether, this probably explains the actual absence of consensus on a common RSA test. Training interventions and/or ergogenic aids that are able to lessen the influence of the aforementioned limiting factors should improve RSA. For instance, repeated sprint training in hypoxia has been demonstrated to improve team-sport athlete’ physical performance (Brocherie et al., 2015) via different physiological adaptations: muscle molecular, neuromuscular, biomechanical and metabolic changes which may improve blood perfusion level and behavior of fast twitch fibers (Faiss et al., 2013). Bearing in mind that “there’s more than one way to skin the cat” when prescribing training, there is not one type of training that can be recommended to best improve RSA and all of the factors believed to be responsible for performance decrements during RSA tasks.

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Wann ist Abseits? Modellbasierte fachliche und sprachliche Aufgabenentwicklung im Fachbereich Bewegung und Sport**Autor/innen:** Gogoll A¹, Jeisy E¹¹Ressort Sport & Erziehung, Eidgenössische Hochschule für Sport Magglingen, Schweiz**Einleitung:**

In der aktuellen deutschsprachigen fachdidaktischen Diskussion um das Schulfach Sport gewinnen konzeptuelle Überlegungen an Bedeutung, die die reflexive Auseinandersetzung der Schülerinnen und Schüler mit den Praxisformen der Bewegungs- und Sportkultur und die daraus resultierenden kognitiven Lernerträge in den Vordergrund der wissenschaftlichen und unterrichtspraktischen Aufmerksamkeit rücken (vgl. Serwe-Pandrick, i.Dr.). Dazu gehören insbesondere solche Ansätze, die sich darum bemühen, fachliche Bildungsvorstellungen mit Hilfe des Kompetenzkonstrukts auf der Ebene psychischer Dispositionen konkreter zu fassen und damit auch empirisch messbar zu machen (vgl. Gogoll, 2013). Bis anhin existieren noch keine Testinstrumente, die die im Sportunterricht zu erwerbenden kognitiven Leistungsdispositionen von Schülerinnen und Schülern messen könnten. Dieses Desiderat aufnehmend stellt der vorliegende Beitrag erste Ergebnisse zur Entwicklung eines geeigneten Testinstruments zur Erfassung von sportbezogenen Schülerkompetenzen vor.

Methode:

Die Erarbeitung und Prüfung erster Testaufgaben für ein solches Instrument erfolgte im organisatorischen Rahmen der deutsch-schweizerischen *Arbeitsgruppe Fach und Sprache*, an der die beiden Referenten, weitere Fachdidaktiker der Fächer Mathematik, Physik, Deutsch, Musik und Sport sowie zwei empirische Bildungsforscher beteiligt sind (vgl. <http://www.fach-und-sprache.de>). Es wurde untersucht, auf welche Weise sich sowohl fachliche als auch sprachliche Variationen der Schwierigkeiten der Aufgaben empirisch abbilden lassen. Dazu wurden insgesamt 45 schulbuch-ähnliche Aufgaben entwickelt, welche die drei Aspekte Fach (Mathematik, Physik, Sport, Musik, Deutsch), fachliches Anforderungsniveau (leicht, mittel, schwer) und sprachliches Anforderungsniveau (leicht, mittel, schwer) systematisch berücksichtigen. Die Testdurchführung erfolgte in einem multiplen Matrixdesign, welches die Rotation der Aufgaben über drei Testhefte vorsah. Jedes Testheft enthielt jeweils 15 Testaufgaben mit fachlich und sprachlich unterschiedlicher Schwierigkeit, einen C-Test zur Erfassung der allgemein-sprachlichen Fähigkeiten der Schülerinnen und Schüler sowie einen kurzen Fragebogen zur Erfassung soziodemografischer Merkmale. Die getestete Stichprobe besteht aus N=601 Schülerinnen und Schülern im Alter von 12.7 Jahren.

Resultate:

Die Ergebnisse der für die sportbezogenen Testaufgaben durchgeführten Rasch-Analyse weisen zunächst auf geringe Abweichungen der für die einzelnen Aufgaben ermittelten gewichteten Mean-Square-Fit-Statistiken hin. Alle gewichteten Itemfit-Werte liegen im als akzeptabel erachteten Bereich von 0.8 bis 1.2 und lassen keine Probleme der Aufgaben erkennen. Betrachtet man die Itemschwierigkeiten isoliert, so zeigt sich jedoch, dass die Ergebnisse sowohl in fachlicher, als auch in sprachlicher Hinsicht empirisch von den zu Grunde liegenden Modellen abweichen.

Diskussion:

Die aufgrund der ersten Analysen vorgenommene Reflexion der Aufgaben und ihrer Entwicklung haben gezeigt, dass neben handwerklichen Fehlern vor allem die curriculare Validität der Testaufgaben für das Schulfach Sport nicht gegeben ist. In einem Folgeprojekt soll daher ein Test entwickelt werden, der eine kontextualisierte und „proximale“ Erfassung von handlungsbezogenen kognitiven Kompetenzen im Schulfach Sport ermöglicht.

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Verknüpfung von Theorie und Sportpraxis in der Lehre

Teil 1: Diskussion und Austausch bestehender Konzeptionen an verschiedenen Hochschulen

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Struktur:

Für die Ausbildungsstrukturen sportwissenschaftlicher Lehre an Hochschulen in der Schweiz ist eine formale Trennung in theoretische Teildisziplinen und sportpraktische Kurse nach wie vor kennzeichnend. Die Orientierung der Inhalte und Ziele erfolgt damit eng an der Systematik der jeweils zugrundeliegenden Wissenschafts- oder Praxisdisziplin. Aus diesem Grund wird die Leitidee einer Vernetzung der Lehre in Theorie und Praxis an den Sportinstituten der Schweiz rege diskutiert und weiterentwickelt. An der SGS-Tagung 2013 in Basel wurde dem Thema erstmals Raum gegeben. Aus einer integrativen sportwissenschaftlichen Sichtweise kann Lernen - sowohl von theoretischen als auch von sportpraktischen Inhalten - nicht als linearer Prozess verstanden werden, bei dem Neues additiv hinzukommt. Neues relativiert vielmehr bereits Gelerntes. Solche Lernprozesse verlangen von den Lernenden und vom Lehrenden mehr ab, nämlich ein reflexives Lehren und Lernen (Herzog, 2002). Das im AK angestrebte Überwinden der Kluft zwischen theoretischem Wissen und praktischem Handeln scheint bedeutsam zu sein, um Lehr-/Lernkurzschlüsse zu vermeiden, wie sie bspw. in der Gleichsetzung sportlichen Könnens mit dem Verstehen sportlichen Könnens oder mit der Fähigkeit, sportliches Können zu vermitteln, zum Ausdruck kommt (Blotzheim et. al., 2008). Gearbeitet wird in zwei zusammenhängenden Arbeitskreisen (AK): Der hier beschriebene AK bildet den Vorbau zum AK „Verknüpfung von Theorie und Sportpraxis in der Lehre – Teil 2: Vernetzungsbeispiel in die sportliche Praxis des Geräteturnens“ vom späten Freitagvormittag. In diesem ersten AK (Teil 1) geht es um den diskursiven Austausch bezüglich leitender Theorie-Praxis-Vernetzungskonzeptionen an den verschiedenen Hochschulen.

Literatur:

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Verknüpfung von Theorie und Sportpraxis in der Lehre

Teil 2: Vernetzungsbeispiel in die sportliche Praxis des Geräteturnens

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³Departement Gesundheitswissenschaften und Technologie, ETH Zürich, Schweiz

⁴Eidgenössische Hochschule für Sport, Magglingen, Schweiz

Struktur:

Für die Ausbildungsstrukturen sportwissenschaftlicher Lehre an Hochschulen in der Schweiz ist eine formale Trennung in theoretische Teildisziplinen und sportpraktische Kurse nach wie vor kennzeichnend. Die Orientierung der Inhalte und Ziele erfolgt damit eng an der Systematik der jeweils zugrundeliegenden Wissenschafts- oder Praxisdisziplin. Aus diesem Grund wird die Leitidee einer Vernetzung der Lehre in Theorie und Praxis an den Sportinstituten der Schweiz rege diskutiert und weiterentwickelt. An der SGS-Tagung 2013 in Basel wurde dem Thema erstmals Raum gegeben. Aus einer integrativen sportwissenschaftlichen Sichtweise kann Lernen - sowohl von theoretischen als auch von sportpraktischen Inhalten - nicht als linearer Prozess verstanden werden, bei dem Neues additiv hinzukommt. Neues relativiert vielmehr bereits Gelerntes. Solche Lernprozesse verlangen von den Lernenden und vom Lehrenden mehr ab, nämlich ein reflexives Lehren und Lernen (Herzog, 2002). Das im AK angestrebte Überwinden der Kluft zwischen theoretischem Wissen und praktischem Handeln scheint bedeutsam zu sein, um Lehr-/Lernkurzschlüsse zu vermeiden, wie sie bspw. in der Gleichsetzung sportlichen Könnens mit dem Verstehen sportlichen Könnens oder mit der Fähigkeit, sportliches Können zu vermitteln, zum Ausdruck kommt (Blotzheim et. al., 2008). Gearbeitet wird in zwei zusammenhängenden Arbeitskreisen (AK): Der hier beschriebene AK ist aufbauend auf den AK „Verknüpfung von Theorie und Sportpraxis in der Lehre – Teil 1: Diskussion und Austausch bestehender Konzeptionen an verschiedenen Hochschulen“ vom frühen Freitagvormittag. In diesem AK (Teil 2) wird die Berner Theorie-Praxis-Vernetzungskonzeption vorgestellt, und zwar in dem exemplarisch die Funktionale Bewegungsanalyse (Göhner, 2012) in die sportliche Praxis des Geräteturnens übersetzt wird. Der AK findet unter Einbezug der Teilnehmenden in der Sporthalle statt.

Literatur:

- Blotzheim, D., Kamper, S., & Schneider, R. (2008). Überlegungen zur Vermittlung metakognitiver Kompetenz in der Sportlehrerausbildung durch Forschendes Lernen. *bildungsforschung*, 5(2).
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- Göhner, U. (2012). *Fundamentum einer angewandten Bewegungslehre und Biomechanik des Sports*. Tübingen: Eigenverlag.
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Peripheral vision in martial arts: How anchoring gaze helps athletes in Kung Fu and Tae Kwon Do**Authors:** Hausegger T¹, Vater C¹, Hossner E-J¹¹Institute of Sport Science, University of Bern, Switzerland**Introduction:**

In martial arts, athletes anchor their gaze on a specific location on the opponent's body to optimally use their peripheral vision for defending attacks (Ripoll, Kerlirzin, Stein, & Reine, 1995; Williams & Elliott, 1999). If anchoring is functional to use peripheral vision, the height of gaze anchoring should differ between martial arts. For example, in Kung Fu (Qwan Ki Do, QKD) arms and legs are used for attacks, whereas in Tae Kwon Do (TKD) the legs are regularly used for attacks. Thus, to minimize the distance from the location of gaze to possible locations of attacks, a difference in the height of gaze anchoring in QKD should be higher compared to TKD. This was tested in an insitu experiment with QKD and TKD experts.

Methods:

10 QKD and 10 TKD experts had to react on 24 martial art specific attacks (2 sessions with 12 trials each) with 3 representative complexity levels (1, 2 or 3 techniques in a row). Attacks were performed by a QKD or TKD expert while participants were free to move after the initiation of these attacks. Eye movements were recorded with an EyeSeeCam (ESC). For the analysis, a saccade detection algorithm was used to identify fixations in 7 phases (starting position, movement initiation, technique 1, transition 1, technique 2, transition 2 and technique 3) of the two martial arts. To identify whether expertise influences gaze anchoring, the 20 experts were subdivided in higher-experienced and lower-experienced athletes (based on their highest rank in an (inter-)national tournament). Differences in gaze anchoring were tested with a 2 (expertise) x 7 (phase) ANOVA with repeated measures on the second factor. In case of significant interactions, one-tailed post-hoc t-tests were performed. Level of significance was set to 0.05 and partial eta squares (η_p^2) were computed as effect sizes.

Results:

There was a significant main effect for phase, $F(3.19, 54.27) = 20.06$, $p < 0.01$, $\eta_p^2 = 0.54$, and an interaction effect between phase and martial art, $F(3.19, 54.27) = 5.20$, $p < 0.01$, $\eta_p^2 = 0.26$. Post hoc tests revealed a significant difference for the phases starting position, movement initiation, technique 1, and transition 1 (all, $p < 0.05$; other phases $p > 0.28$) showing that TKD athletes anchor their gaze significantly lower than QKD athletes in the first 4 phases. Furthermore, a main effect for phase could be found in the expertise comparison, $F(2.41, 40.90) = 17.33$, $p < 0.01$, $\eta_p^2 = 0.51$. Post hoc comparison revealed differences between the phases technique 1, transition 1 and transition 2 (all $p < 0.05$, other phases $p > 0.06$). No other main or interaction effect was found (all $p > 0.1$). Descriptively, gaze anchoring of lower-experienced athletes was lower compared to higher-experienced athletes in all 7 phases.

Discussion:

As predicted, the height of gaze anchoring varied as a function of martial arts. QKD athletes anchored their gaze higher than TKD athletes until the end of technique 1. Results further show that especially QKD athletes anchored their gaze around the opponents shoulder line, even when kicks were performed. Thus, a rather high anchoring of gaze and the accompanied use of peripheral vision seems to be functional to quickly react to opponent's attacks. This practically relevant finding should especially be taken into account for training youth martial arts athletes.

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Zur Bedeutung sportbezogener Verhaltensmuster in der Familie für die Sportpartizipation Jugendlicher**Autor/innen:** Hayoz C¹, Klostermann C¹, Schlesinger T², Nagel S¹¹Institut für Sportwissenschaft, Universität Bern, Schweiz²Institut für Angewandte Bewegungswissenschaften, Technische Universität Chemnitz, Deutschland**Einleitung:**

In der Sportpartizipation Jugendlicher und junger Erwachsener bestehen trotz vielfältiger Bemühungen der Sport- und Bewegungsförderung nach wie vor soziale Ungleichheiten und die Ausstiegsraten sind darüber hinaus relativ hoch (Nagel, 2003). Ein möglicher Erklärungsansatz für diese sozialen Ungleichheiten dürften aus einer sozialisationstheoretischen Perspektive die transgenerationale Vermittlung von sportbezogenen Wertvorstellungen und Verhaltensmuster in der Familie sein (Baur, 1989; Burrmann, 2005). Im Familienalltag wird den Aspekten Bewegung und Sport eine unterschiedliche Bedeutung zugesprochen, weshalb der Frage nachgegangen wird, inwiefern das Sportverhalten von Jugendlichen über sportbezogene Wertvorstellungen und Verhaltensmuster in der Familie beeinflusst wird.

Methode:

Mittels eines Online-Fragebogens wurden insgesamt 1909 Heranwachsende im Alter von 15 bis 20 Jahren ($n = 1909$; $M = 17.3$, $SD = 1.7$) zu ihrem aktuellen Sportverhalten sowie zu den sportbezogenen Verhaltensmustern in ihrer Familie befragt. Nebst dieser quantitativen Untersuchung wurden teilstrukturierte Interviews mit 13 Jugendlichen und jungen Erwachsenen im Alter zwischen 15 und 25 Jahren mit denselben Themenschwerpunkten geführt.

Resultate:

Die Ergebnisse der multiplen linearen Regression zeigen, dass wichtige Prädiktoren der Sportpartizipation von Jugendlichen die Kommunikation über Sport ($\beta = .19$, $p < .001$), die gegenseitige Unterstützung ($\beta = .16$, $p < .001$), die regelmässige Sportaktivität ($\beta = .11$, $p < .01$) sowie der Stellenwert des Sports in der Familie ($\beta = .09$, $p < .05$) darstellen. Die gemeinsame Sportaktivität in der Familie sowie das sportbezogene Gesundheitsbewusstsein im Familienalltag sind für die Sportbeteiligung Jugendlicher nicht relevant. Die signifikanten familiären Sportverhaltensmuster klären 16.8% der Varianz auf. Mithilfe der strukturierenden qualitativen Inhaltsanalyse nach Mayring (2002) lassen sich aus den Interviews vertiefende Aussagen zu den einzelnen Prädiktoren machen.

Diskussion:

Die quantitativen sowie qualitativen Ergebnisse zeigen die Relevanz des Stellenwerts des Sports sowie gewisser habitueller Sportverhaltensmuster in der Familie für die Sportbeteiligung der Jugendlichen auf. Die Sportförderung der jüngeren Generation über das familiäre Sportverhalten und deren sportbezogenen Wertvorstellungen scheint eine fruchtbare Strategie zu sein, um beim Nachwuchs aktive Sportverhaltensmuster zu entwickeln und dadurch die Sportpartizipation bis hin zum Jugend- und Erwachsenenalter aufrecht zu erhalten. Um zielgerichtet auf Familien zugeschnittene Sportförderprogramme schaffen zu können, sind jedoch weitere Untersuchungen zur transgenerationalen Vermittlung von sportbezogenen Wertvorstellungen und Verhaltensmuster in Familien notwendig.

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The impact of mental practices of motor performance of tennis skills in young boys and girls**Authors:** Hegazy K^{1,2}, Sherif A²¹Department of Sports and Sports Science, Karlsruhe Institute of Technology, Germany²Faculty of Sport Education Abu Qir, Alexandria University, Egypt**Introduction:**

The main objective of Physical Education in primary schools is to provide children with positive psychomotor experiences so that after their school graduation they will keep on exercising throughout their whole life (Papaioannou et al, 1999). Tennis learning on mini courts is a valuable step to all ages as an introduction to playing the full-scale game. All the skills used in regulation tennis- flat and top spin ground strokes, volleys, lobs etc. can be developed. In fact, mini-courts are an ideal development tool for players of all abilities. Skills, developed on the mini tennis court are easily transferable to full-size tennis. Furthermore, it offers a unique opportunity for tennis to attract innumerable new participants. Imagery is not a substitute for physical practice, but a skill to enhance practice and performance. In addition, imagery combined with relaxation is more effective than imagery alone. Since the schools in Egypt don't have tennis as an activity in the physical education curriculum and few references have been found so far with regard to practice mental training with children, specifically relaxation and positive imagery, the present study aims to apply tennis in the school and specifically test whether the mental practice of motor performance can be useful or not in teaching tennis skills to children.

Methods:

38 schoolchildren participated in the study (25 boys, 13 girls) from 3rd primary school of Franciscan in Abu Qir, Alexandria, Egypt, ages 8-10 years. The study was planned and implemented during the school year 2012-2013 and its duration was approximately one month. There were four groups, two experimental and two control groups. Pupils of the experimental groups were taught tennis skills based on mental practices, specifically (relaxation and positive imagery) during nine lessons. In the control groups the pupils were taught the tennis skills without mental practices. Measurements were conducted with the use of motor evaluation tests after the end of the intervention, to evaluate the technical performance of forehand and backhand in terms of five steps (ready position- preparation- swing- impact- follow-up) by two tennis experts using a scale from 1 to 5 degrees.

Results:

The results of ANOVA showed highly significant differences between mean scores of the 4 groups for forehand and backhand ($F=14.600$; $p=0.000$ for forehand and $F=11.502$; $p=0.000$ for backhand). Furthermore, Scheffe's test showed significant differences confirming that experimental boys had the best results being significantly higher than the means of the other 3 groups for both forehand and backhand. The only other significant difference existed between control boys and control girls in favor of boys for the forehand ($p=0.021$).

Discussion:

The result of the present study partially corroborates with those found in previous studies (Coelho et al., 2008) which claim that not all performance situations could be improved by imagery, only those that do not require precision. Furthermore, researchers have shown that mental training is suitable for beginners as well as for performance optimization in intermediates and experts, also for children and youths for the optimization of precision and quality of movement. As a conclusion, mental practice of motor performance helps building tennis skills for young boys and girls particularly boys under 10 years old and provides a better solution in a context of a tennis training program in the primary school.

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Der Entwicklungsverlauf motorischer Basiskompetenzen in der ersten Primarschulklasse

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Einleitung:

Ein zentrales Ziel des Sportunterrichts ist die Förderung motorischer Basiskompetenzen (MOBAK), welche Voraussetzung für eine aktive Teilnahme an der Sport- und Bewegungskultur sind (Kurz, Fritz, & Tscherpel, 2008). Somit besteht aus Sicht der Schulforschung die Frage, ob und wie sich eine Entwicklung derartiger Kompetenzen messen und beschreiben lässt. Erst dann wird es möglich, neben dem Effekt von Sportunterricht auf die motorischen Basiskompetenzen weitere Determinanten der motorischen Entwicklung zu identifizieren (bspw. außerschulisches Sportengagement).

Methode:

Im Rahmen der Evaluation des Projekts „Schulkids in Bewegung“ (SKIB) in Frankfurt konnten 934 Schüler/innen ($\varnothing = 46\%$; $M = 6.86$, $SD = .54$) im Oktober 2014 (t_1) und im Juni 2015 (t_2) längsschnittlich mit dem MOBAK-1 Testinstrument (Herrmann, Gerlach, & Seelig, 2015) untersucht werden. Hierbei wurden die Kompetenzen in den beiden Faktoren „Sich-Bewegen“ und „Etwas-Bewegen“ gemessen. Mittels autoregressiver IRT-Strukturgleichungsmodelle wurde die faktorielle Invarianz sowie die Stabilität der motorischen Basiskompetenzen über die Zeit geprüft. Zusätzlich wurden 622 Eltern ($\varnothing = 73\%$) zur sportlichen Aktivität (SKIB-Teilnahme, Freizeit- und Vereinssport) ihrer Kinder mittels Fragebogen befragt. Darauf aufbauend wurde der Einfluss des SKIB-Projekts sowie des Freizeit- und Vereinssport auf die Veränderung der motorischen Basiskompetenzen geprüft.

Resultate:

Das Strukturgleichungsmodell zur Prüfung der faktoriellen Invarianz zeigt eine gute Modellanpassung ($CFI = .99$; $RMSEA = .022$). Die Faktorenstruktur mit den beiden MOBAK-Faktoren „Sich-Bewegen“ und „Etwas-Bewegen“ bleibt über die Zeit stabil. Die Erfüllung dieser wichtigen Voraussetzung bedeutet, dass Längsschnittanalysen mittels des MOBAK-1 Testinstruments zulässig sind. Es zeigen sich eine signifikante Verbesserung der Faktorsummenwerte beim „Etwas-Bewegen“ ($F = 562.33$; $p < .01$; $\eta^2 = .375$) und beim „Sich-Bewegen“ ($F = 340.81$; $p < .01$; $\eta^2 = .269$) über die Zeit. Die weiterführenden Analysen weisen auf differentielle Effekte hin. Die Veränderungsstärke steht in Zusammenhang mit den zum ersten Messzeitpunkt gezeigten MOBAK-Werten: Je geringer die Eingangswerte, desto deutlicher fallen die Zuwächse in den motorischen Basiskompetenzen aus. Die Berücksichtigung von außerschulischer sportlicher Aktivität (Kovariaten: Umfang Ballsport, Umfang Individualsport, Häufigkeit Freizeitsport, Teilnahme SKIB) im Strukturgleichungsmodell zeigt, dass der „Umfang Ballsport“ ($\beta = .26$) und die „Häufigkeit Freizeitsport“ ($\beta = .16$) signifikante Einflüsse auf die Veränderung im MOBAK-Faktor „Etwas-Bewegen“ ($CFI = .97$, $RMSEA = .039$) besitzen. Der „Umfang Individualsport“ ($\beta = .33$) sowie die „Teilnahme SKIB“ ($\beta = .16$) zeigen signifikante Einflüsse auf die Veränderung im MOBAK-Faktor „Sich-Bewegen“ ($CFI = .95$, $RMSEA = .036$).

Diskussion:

Das MOBAK-1 Testinstrument eignet sich zur Evaluation von Veränderungen in den motorischen Basiskompetenzen. Es konnten weitere Einflussfaktoren auf deren Veränderung in einem Schuljahr identifiziert werden, welche die Bedeutsamkeit vom außerschulischen Sportengagement auf das motorische Lernen hervorhebt.

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Evaluation of basic motor competencies in primary school – Development of test instruments**Authors:** Herrmann C¹, Pühse U¹, Seelig H¹¹Department of Sport, Exercise and Health, University of Basel, Switzerland**Introduction:**

A central aim of physical education (PE) is the promotion of basic motor competencies (in German: Motorische Basiskompetenzen; MOBAK) which are prerequisites for childrens' active participation in sports culture (Kurz, Fritz, & Tscherpel, 2008). While instruments for measuring motor abilities in schoolchildren have been developed, less is known about the measurement of MOBAK (Herrmann, Gerlach, & Seelig, 2015a). We introduce a newly developed measure of MOBAK for the first and the third grade, which contains eight dichotomous items each. Findings from three validation studies are presented.

Methods:

Study 1 (N=317 first-graders ♀=55%; M=7.0 years) took place in Zurich (CH) (Herrmann, Gerlach, & Seelig, 2015b), study 2 (N=1061 first-graders ♀=45%; M=6.8 years) in Frankfurt (D) and study 3 (N=323 third-graders ♀=49%; M=9.2 years) in Basel (CH). All studies focused on construct validity (e.g., the factorial validity of the instrument) and the assessment of the extent to which the instrument may be useful in detecting distinct pattern of MOBAK. In addition, the first two studies also investigated the relationship between MOBAK and motor abilities. Exploratory (EFA) and confirmatory factor analyses (CFA) as well as latent class analysis (LCA) were performed using MPlus.

Results:

We found two factors consisting of four items each in all three studies. The related EFA (Study 1: CFI=.98; RMSEA=.024) and CFA (Study 2: CFI=.95; RMSEA=.044; Study 3: CFI=.97; RMSEA=.037) revealed good model fit indices. The first factor "Locomotion" represents body movements (e.g., balancing), the second factor "Object-control" represents ball control (e.g., catching). In Study 2 four distinct patterns could be identified by LCA, which indicate high and low "scorers" in each dimension. Adding motor ability tests (e.g., long-jumping, sprinting) in EFA (Study 1: CFI=.99; RMSEA=.031) and CFA (Study 2: CFI=.96; RMSEA=.042) with the eight MOBAK-items did not result in a change of the MOBAK factor structure, indicating that motor abilities form a separate factor.

Discussion:

The developed MOBAK test instrument meets psychometric validity demands, i.e. factorial, prognostic and discriminant validity. The eight-item test instruments are suitable for the evaluation of effects of PE.

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De la probabilité de réussir sa meilleure performance de la saison lors d'un championnat international en athlétisme**Auteurs:** Heyer L¹, Villemin T¹, Romann M¹¹Haute Ecole Fédérale de Sport Macolin, Suisse**Introduction:**

L'objectif de chaque athlète est de performer au plus haut niveau lors d'un championnat international. Le résultat chronométrique ou métrique, la performance chiffrée, devient donc un indicateur de réussite utilisé par les entraîneurs, les médias, les institutions politico-sportives pour juger de la qualité du résultat d'un athlète ou même d'une fédération (Hopkins, 2001). Est-ce que l'athlète a évolué à son meilleur niveau ? A-t-il amélioré sa meilleure performance ? Le but de cette étude est de livrer les chiffres réels quant à la probabilité de réussir sa meilleure performance de la saison lors d'un grand championnat en athlétisme.

Méthodes:

Pour tous les participants et participantes (n=6143) des Jeux Olympiques 2008 et 2012, des championnats du monde 2011 et 2013 et des championnats d'Europe 2010 et 2012, la meilleure performance de la saison (SB) a été comparée avec la performance réussie lors du championnat (RES). La déperdition de performance (en %) a également été calculée. Les athlètes n'ayant pas réussi les minimas internationaux, mais tout de même invités à participer, n'ont pas été pris en compte. Les disciplines du marathon (peu de SB) et du relais (résultat d'équipe) n'ont pas été intégrées à la présente étude. Les athlètes disqualifiés (DQ) ou n'ayant pas pris le départ (DNS) ou ayant abandonné (DNF) ont été exclus. Un test non-paramétrique de Mann-Whitney a été utilisé pour différencier les pourcentages de réussite des SB et une ANOVA à un paramètre a permis de différencier les déperditions de performance.

Résultats:

Seulement 19.8% des participants (hommes : 16.6% / femmes : 23.1%) améliorent leurs SB lors d'un championnat international. La diminution de performance est de $-2.4 \pm 3.1\%$ (hommes : $-2.5 \pm 3.3\%$ / femmes $-2.2 \pm 3.0\%$; $p < 0.01$). On remarque que 37% des finalistes (TOP8) ont réussi une SB lors du championnat contre 10.7% aux non-finalistes (REST). Le TOP8 perd en moyenne $-0.8 \pm 2.2\%$ sur sa SB, le REST $-3.2 \pm 3.3\%$ ($p < 0.01$).

Discussion:

Les résultats démontrent que très peu d'athlètes réussissent une nouvelle meilleure performance de la saison lors d'un championnat international. Les raisons peuvent être multiples : conditions météorologiques (vent), horaires, déroulement tactique des courses, nombre d'essais, stress, etc. La diminution de performance est plus faible chez les femmes, cependant, une analyse différenciée montre que c'est principalement dans les courses de 800m à 10'000m que ces différences sont très marquées (hommes : $-2.1 \pm 1.9\%$; femmes : $-1.2 \pm 2.1\%$; $p < 0.01$). Les hommes préfèrent courir de manière plus tactique, les femmes préférant courir « all-out » (Hewson, 2001). Les TOP8 montrent un plus grand pourcentage de SB, ainsi qu'une plus faible diminution de la performance moyenne par rapport à REST. Cette capacité à se surpasser dans un grand événement semble faire partie des qualités des athlètes de haut niveau. La comparaison de la performance en grand championnat avec la SB n'est pas un bon indicateur de réussite. Le rang dans la liste de départ comparé avec le rang final pourrait donner une meilleure évaluation de la performance par rapport aux adversaires dans les conditions propres d'un championnat international.

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Effects of a home-based exercise program for chronically ill and mobility-limited older adults supported by general practitioner practices – a randomized controlled trial**Authors:** Hinrichs T¹, Bücker B^{2,3}, Klaaßen-Mielke R⁴, Brach M⁵, Wilm S³, Platen P⁶, Moschny A^{4,6}¹Division of Sports and Exercise Medicine, Department of Sport, Exercise and Health, University of Basel, Basel, Switzerland²Institute of General Practice and Family Medicine, University of Witten/Herdecke, Germany³Institute of General Practice, University of Düsseldorf, Germany⁴Department of Medical Informatics, Biometry and Epidemiology, University of Bochum, Germany⁵Institute of Sport and Exercise Sciences, University of Münster, Germany⁶Department of Sports Medicine and Sports Nutrition, University of Bochum, Germany**Introduction:**

Despite the known benefits of regular physical activity in maintaining mobility and preventing the progression of chronic diseases in older adults, activity levels among individuals affected by limitation or disease are particularly low. Not only can the individuals' own perception of limited health be a major barrier to engagement in physical activity, they are also difficult to reach for interventions when they live in their own homes. Hence, a new kind of collaboration between general practitioners (GPs) and exercise therapists was set up, in which patients are recruited and assessed for eligibility by their GP and counseled by therapists at the GP's practice. A pilot study showed good feasibility of the new concept. The present study evaluated the effects on physical function, physical activity, quality of life, fall-related self-efficacy and exercise self-efficacy.

Methods:

Chronically ill and mobility-limited patients age 70 or older were recruited for a randomized controlled trial (HOMEfit; Reg.-No. ISRCTN17727272) in 15 GP practices. The experimental intervention (duration 12 weeks) – a multidimensional home-based exercise program integrating behavioral strategies – was delivered by an exercise therapist in individual counseling sessions at the GP's practice and on the telephone. The control intervention focused on promoting light-intensity activities of daily life. The primary outcome was functional lower body strength (chair rise test). Secondary outcomes were physical function (battery of motor tests), physical activity (step count), health-related quality of life (SF-8), fall-related (FES-I) and exercise self-efficacy (SSA-Scale). Post-interventional differences between the groups were tested with ANCOVA (intention-to-treat; adjusted for baseline value and GP practice; level of significance $p \leq 0.05$). Adverse events (AEs) were documented at least at every counseling session and assessed by the GP and by the AE manager.

Results:

Participants ($n=209$) were aged 80 ± 5 years (74% female; 87% with ≥ 3 chronic diseases; 54% with a walking aid). The drop-out rate was 22% in the experimental and 14% in the control group. The difference (experimental minus control; 95% confidence interval) between adjusted post-interventional chair-rise times was $-0.1 [-1.8; 1.7]$. Differences for all secondary outcomes were also non-significant. Altogether, 151 AEs in 47% ($n=99$) of all participants were reported. Two events were judged to be caused by the intervention (both were non-serious and occurred in the experimental group).

Discussion:

We developed a physical activity concept for community-dwelling, chronically ill, and mobility-limited GP patients that established cooperation between GPs and exercise therapists to approach and support the patients. The randomized controlled trial showed that the concept is ineffective in its current form. However, feasibility, acceptance and safety were confirmed; therefore adaptations and re-evaluation should be considered.

The HOMEfit trial (<http://www.rub.de/homefit>) was conducted within the research cooperation PRISCUS (Prerequisites for a new health care model for elderly people with multimorbidity) and was funded by the German Federal Ministry of Education and Research (BMBF; Reg.-No. 01ET1005A).

Effects of exergaming on physical activity in overweight individuals – a systematic review**Authors:** Höchsmann C¹, Schüpbach M¹, Schmidt-Trucksäss A¹¹Department of Sport, Exercise and Health, Division Sports and Exercise Medicine, University of Basel, Switzerland**Introduction:**

The majority of patients with overweight and type 2 diabetes are insufficiently physically active (Kohl et al., 2012). Despite the various physiological and psychological benefits obtained by physical activity (PA), overweight and type 2 diabetic patients generally are not motivated to engage in regular PA, and long-term adherence to PA is very poor (Qiu, Sun, Cai, Liu, & Yang, 2012). Combining PA and video games in so-called “exergames” offers a new and entertaining approach that may motivate these individuals to overcome their sedentary lifestyle and become more physically active (Thompson, 2012). The objective of this systematic review was to review the current evidence for the effectiveness of exergaming in overweight and type 2 diabetes mellitus and thus to evaluate the suitability of these games to be used as tools for exercise promotion that meet current PA guidelines.

Methods:

This systematic review was conducted and reported in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA). An electronic search of the literature was performed in PubMed, EMBASE, Web of Science, OpenGrey, and the Cochrane Central Register of Controlled Trials up until March 2015. Randomized controlled trials (RCT) and cross-sectional studies, published in English in a peer-reviewed journal, analyzing the effects of exergames on objectively measured intensity parameters of PA in overweight (body mass index (BMI) $\geq 25\text{kg/m}^2$) adults (mean age ≥ 18 years) with and without type 2 diabetes were included. Study selection, data extraction and quality assessment were performed independently by two review authors. Primary outcomes included changes in oxygen uptake (VO_2), energy expenditure (EE), heart rate (HR) or activity counts. Secondary outcomes were enjoyment of treatment, exercise adherence, ratings of perceived exertion (RPE), changes in body composition and changes in blood parameters (serum glucose, long-term blood glucose, blood cholesterol, triglycerides or serum lactate).

Results:

Fourteen publications (11 studies) out of 2,845 records met the inclusion criteria. All included studies (10 experimental, cross-sectional laboratory studies and one RCT) were able to show increases in either VO_2 , EE, HR or activity counts. However, effects of exergaming regarding the changes in these intensity parameters varied significantly between studies due to different game modes and consoles used as well as because of the vastly differing durations of exergame activity applied. Of all included studies, only one had a low risk of bias and three had a high risk of bias. Seven studies had an unclear risk of bias due to insufficient information provided in the study description. No studies were found investigating the changes in objectively measured PA intensity parameters in type 2 diabetic patients.

Discussion:

This review suggests that exergames are in principle able to increase PA among overweight individuals. However, the inconsistent results and the overall poor or moderate methodological quality do not permit judgment, whether exergames are suitable to meet PA guidelines in this target group. The lack of research regarding the effects of exergames in type 2 diabetes indicates a great need for future research.

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Zwischen Elfenbeinturm und Sportplatz: Sportwissenschaft problemorientiert

Organisator/innen: Hossner EJ¹, Klostermann A¹

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Struktur:

Problemorientierung darf als ein besonderes Merkmal sportwissenschaftlich-interdisziplinärer Forschung angesehen werden. Problemorientierte Forschung ist dabei dadurch gekennzeichnet, dass sie an einem Problem ansetzt, welches in der Welt der Sportpraxis als relevant erachtet wird. Zur optimalen Ausschöpfung potentieller Synergien zwischen wissenschaftlichem und praktischem Wissen erfolgt die Problemzersetzung wünschenswerterweise in einer engen Kooperation zwischen Vertreterinnen oder Vertretern der Wissenschaft auf der einen Seite und Vertreterinnen oder Vertretern des jeweiligen Praxisfeldes auf der anderen Seite. Nach einem Aufriss der hiermit angerissenen Thematik in einem Impulsreferat zum Wissensmanagement (Conz) werden in der Plenumsveranstaltung Projekte vorgestellt, die in diesem Sinne einen „Best-Practice“-Status beanspruchen können. Die Projekte weisen dabei eine grosse Breite hinsichtlich der in den Blick genommenen Praxisfelder auf. Im Detail werden Forschungsvorhaben präsentiert, die der motorikwissenschaftlichen (Kredel & Tartaruga) oder biomechanischen (Lorenzetti & Amman) leistungssportlichen Begleitforschung, der schulsportbezogenen (Valkanover & Berger) oder trainingswissenschaftlichen (Girard & Brocherie) Implementationsforschung sowie der soziologisch fundierten Verbandsentwicklungsforschung (Nagel & Gygax) zuzuordnen sind.

Beiträge:

- (1) Conz C (Eidgenössische Hochschule für Sport Magglingen)
Forschung ist nicht gleich Forschung. Sportwissenschaftliche Forschung im Leistungssport aus Optik Wissensmanagement
- (2) Kredel R, Tartaruga D (Universität Bern / Swiss Shooting)
Präzisionsleistungen im Luftgewehrshiesen: von der Problemidentifikation zum Trainingssystem
- (3) Lorenzetti S, Ammann F (ETH Zurich / Swiss-Ski)
Biomechanics of squats, drop jumps and imitation jumps of ski jumpers
- (4) Valkanover S, Berger R (Universität Bern / Pädagogische Hochschule Bern)
SelbstTanz: Selbstkonzeptfördernde Tanzvermittlung in der Schule zwischen BISSiger Wissenschafts- und unterrichtsnaher Praxisorientierung
- (5) Girard O, Brocherie F (University of Lausanne / Hockey Club du Mont-Blanc)
Repeated sprint fatigue in team sports
- (6) Nagel S, Gygax M (Universität Bern / Swiss Orienteering)
Sportverbandsentwicklung bei Swiss Orienteering

(for details on the contributions to the plenary sessions, see individual abstracts)

Associations between blood pressure categories, physical activity and cardiorespiratory fitness on retinal vessel diameters in 6 to 8 year old school children**Authors:** Imhof K¹, Faude O¹, Zahner L¹, Schmidt-Trucksäss A¹, Hanssen H¹¹Department of Sport, Exercise and Health, University of Basel, Switzerland**Introduction:**

Retinal vessel alterations have been shown to be associated with cardiovascular risk factors in adults (Ikram et al., 2006). In children it was found that obesity is related to retinal venular dilatation (Hanssen et al., 2012). Moreover, higher blood pressure is not only associated with venular dilatation but also with arteriolar narrowing in young children (Mitchell et al., 2007). So far no study examined the association between blood pressure categories (normotensive (NT), pre-hypertensive (PHT) and hypertensive (HT)) and retinal vessel diameters in children. Furthermore, previous studies in adults report that physical activity has a beneficial influence on retinal vessel diameters. Data in young children is still scarce. Therefore, we examined the associations between cardiorespiratory fitness, play time and blood pressure categories on retinal vessel diameter in 6 to 8 year old children.

Methods:

391 first graders (7.3±0.4 years) of the canton Basel-Stadt were examined in this cross-sectional study. Cardiorespiratory fitness was assessed using a 20m shuttle run test. Retinal microcirculation was determined using a Static Retinal Vessel Analyzer. Blood pressure was examined with an automated oszillograph. Physical activity (time playing outdoor and time playing indoor (per day)) was assessed by a proxy-reported questionnaire. ANOVA was performed to analyse retinal vessel diameters in different categories of blood pressure (blood pressure categories by height, gender and age according to the KiGGS study 2003-2006). For analysing the association between cardiorespiratory fitness and retinal vessel diameters multiple linear regression was applied and adjustments for age, gender, BMI, systolic and diastolic blood pressure were performed.

Results:

74.4% (N=291) of the children were categorized as NT, 11.5% (N=45) as PHT and 14.1% (N=55) as HT. Children with systolic PHT (-5.5 μ m, p=0.01) and systolic HT (-7.5 μ m, p<0.001) had narrower retinal arterioles than their NT peers. Similar results were found for diastolic blood pressure categories and retinal arteriolar diameters (PHT: -5.8 μ m, p=0.01; HT: -7.5 μ m, p<0.001). Cardiorespiratory fitness measured in the 20 m shuttle run correlated with narrower retinal venular diameters (-0.9 (95%CI: -1.8;-0.1) μ m/ unit shuttle run, p=0.04) and a higher arteriolar to venular ratio (0.003 (-0.001; 0.006)/ unit shuttle run, p=0.06). Indoor, not outdoor playing activity, was associated with narrower retinal venules (-0.04 (-0.07; -0.01) μ m/ per unit, p=0.02).

Discussion:

Our data suggests that higher blood pressure, even on the level of PHT, is associated with retinal microvascular alterations in 6 to 8 year old children. In adults, high normal blood pressure seems to have an influence on retinal arteriolar narrowing, which is a preclinical marker for cardiovascular risk and disease manifestations in adults (Ikram et al., 2006). Furthermore cardiorespiratory fitness, as well as time spent playing indoor, have a beneficial influence on retinal venular diameters. It seems that both parameters may have a positive influence on cardiovascular risk reduction in young children.

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Gaze strategies in skateboard trick jumps: Spatio-temporal constraints in complex locomotion**Authors:** Klostermann A¹, Küng P¹¹Institute of Sport Science, University of Bern, Switzerland**Introduction:**

In the context of sports, only a few studies were conducted in which the functional role of visual information processing during locomotor behavior were investigated. In this regard, Vickers (2006) observed a look-ahead strategy in expert ice-skaters who regularly anchor their gaze at the inside line and the tangent point of the ice oval. However, the particular requirement that has been previously sketched with respect to walking (e.g. Patla & Vickers, 1997) and that also is characteristic for sports has not been investigated so far, namely the spatial-temporal adaptation of the locomotor behavior to overcoming obstacles. Therefore, this study aimed to further the knowledge on gaze behavior in locomotion by studying gaze strategies in skateboard jumps of different difficulty that had to be performed either with or without an obstacle.

Methods:

Nine experienced skateboarders performed “Ollie” and “Kickflip” jumps over either an obstacle or over plane surface. The skateboarders’ gaze behavior over two movement phases (“approach” and “jump”) were recorded with a mobile binocular eye-tracking system that was attached to custom-build swim goggles to minimize camera shifts. As dependent variables, the stable gaze at five different areas of interest was calculated regarding its relative duration as well as its temporal order. Separately for the approach and jump phase, the relative gaze duration was subjected to repeated measures ANOVAs as well as planned t-tests.

Results:

Over the approach phase, an interaction between area of interest and obstacle condition was found with longer stable-gaze locations at the take-off area in attempts with an obstacle. In contrast, in attempts over plane surface longer stable gaze locations at the skateboard were revealed. Regarding the trick-difficulty factor, the skateboarders showed longer stable gaze locations at the skateboard for the “Kickflip” than for the “Ollie” in the no-obstacle condition only. Finally, over the jump phase, neither obstacle condition nor trick difficulty affected gaze behavior differentially.

Discussion:

These findings imply that the skateboarders apply two different strategies when preparing the jump movement. In the case of an obstacle, the exact timing of the take-off needs to be planned to avoid a collision such that it is crucial to continuously update information about the distance to this point. In contrast, in the case of a plane surface, the skateboarders were only instructed to perform the jump within a certain jump zone such that motor planning could be predominantly directed to the mere execution of the jump which is reflected in the preferred stable-gaze location at the feet on the skateboard. In addition, the results corroborates earlier findings on the relation between task demands and foveal information processing hypothesizing that longer intervals for visual information processing are required as a function of fine-tuning demands over movement planning and execution (e.g. Klostermann, Kredel, & Hossner, 2013). In sum, this study underlines the functional adaptability of the visuo-motor system to changing demands in highly dynamic situations.

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Zur Bedeutung der Sport- und Bewegungsinfrastruktur im kommunalen Kontext für das Sportverhalten Jugendlicher und junger Erwachsener**Autor/innen:** Klostermann C¹, Hayoz C¹, Schlesinger T², Nagel S¹¹Institut für Sportwissenschaft, Universität Bern, Schweiz²Institut für Angewandte Bewegungswissenschaften, Technische Universität Chemnitz, Deutschland**Einleitung:**

Trotz vielfältiger Bemühungen der Sport- und Bewegungsförderung bestehen nach wie vor soziale Ungleichheiten hinsichtlich der Sportbeteiligung von Jugendlichen und jungen Erwachsenen. In der Schweiz unterscheiden sich darüber hinaus die Sportpartizipationsquoten in den jeweiligen Sprachräumen (z.B. Lamprecht, Fischer & Stamm, 2014). Zur Analyse dieses Phänomens erscheint die Betrachtung individueller Merkmale nicht ausreichend zu sein, sondern es sind auch sportbezogene Strukturbedingungen, insbesondere die kommunale Sport- und Bewegungsinfrastruktur zu beachten. Auf Basis des akteurtheoretischen Zugangs (Schimank, 2010) wird die kommunale Sport- und Bewegungsinfrastruktur als Gelegenheitsstrukturen für Sport- und Bewegungsangebote im nahen Wohnumfeld betrachtet, welche Anreize schaffen und zu Parametern individuellen sportiven Handelns (z.B. Wahl der Sportart) werden können. Die sportbezogenen Strukturbedingungen werden als Erwartungsstrukturen in einem Mehrebenenmodell konzeptualisiert.

Methode:

Zur Analyse der Bedeutung kommunaler Sport- und Bewegungsinfrastruktur für das Sportverhalten wurden in 33 Kommunen (Kriterien geleitete Auswahl) des Kantons Freiburg ($n = 17$) und Bern ($n = 16$) sowohl individuelle Verhaltensdaten als auch strukturelle Faktoren (z.B. Anzahl an Sportanlagen) erfasst. Mittels einer Online-Befragung wurden die 15- bis 30-jährigen Einwohner/innen ($N = 3426$, Alter: $M = 21.74$ Jahre, $SD = 4.75$) detailliert zu ihrem Sportengagement befragt. Informationen zur kommunalen Sport- und Bewegungsinfrastruktur sowie zu den Sportangeboten wurden durch eine schriftliche Befragung sowie einem ergänzenden Interview mit einem Vertreter der Gemeindeverwaltung erfasst.

Resultate und Diskussion:

Die Ergebnisse aus vorherigen Studien bestätigend, ist die Sportbeteiligungsquote der 15- bis 30-Jährigen aus französischsprachigen Kommunen (76.1 % Sportaktive) im Vergleich zu den deutschsprachigen Befragten (83.6 % Sportaktive) signifikant geringer ($\chi^2(1, N = 3426) = 27.58, p < .05$). Dabei sind insbesondere junge Menschen, die in mittelgrossen (3 001 bis 10 000 Einwohner) französischsprachigen Gemeinden wohnen, weniger häufig sportaktiv (74.4 % Sportaktive). Darüber hinaus werden die Sportaktivitäten von den 15- bis 30-Jährigen aus französischsprachigen Kommunen zu 44.87 % und aus kleineren Gemeinden (< 3 000 Einwohner) zu 48.17 % ausserhalb der Wohngemeinde ausgeübt. Im Gegensatz dazu stehen jedoch gerade in den kleineren Gemeinden im Verhältnis zur Einwohnerzahl mehr Sportanlagen wie Einfach- und Mehrfachturnhallen oder Sportplätze zur Verfügung: z.B. durchschnittlich 3.2 Sportplätze pro 1 000 Einwohner in kleineren Gemeinden (< 3 000 Einwohner) und 0.7 Sportplätze pro 1 000 Einwohner in Kommunen mit über 10 000 Einwohner. Insgesamt weisen die Ergebnisse aus den Interviews mit den Gemeindevertretern darauf hin, dass die kommunale Sportförderung nach wie vor stark auf die Förderung dieser „klassischen“ Sportanlagen fokussiert ist. Die Förderung von anderen nachgefragten Sportanlagen, wie etwa Kraft- und Fitnessräume werden kaum berücksichtigt, obwohl ca. 21.7 % der sportaktiven Befragten angaben für ihre Sportaktivitäten Kraft- und Fitnessräume zu nutzen. Die dargestellten Befunde sind insbesondere für die kommunale Sportpolitik und Sportförderung zur Identifizierung wichtiger Handlungsfelder von Bedeutung.

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Which exhaustion criteria for physical exercise testing are sufficient to determine VO₂max?

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Introduction:

In exercise testing exhaustion is necessary to determine the maximum volume of oxygen uptake (VO₂max), but the distinction between subjects that have reached exhaustion and subjects that did not is difficult. To address this problem we compared the maximum heart rate (HRmax), respiratory exchange ratio (RERmax), rating of perceived exertion (RPEmax) and blood lactate concentration (Lacmax) found in young male athletes with the values defined as exhaustion criteria according to three different guidelines: (1) HRmax ≥ 100% of the predicted HRmax (according to the formula 210-age (years)); RERmax ≥ 1.1; RPEmax ≥ 12; Lacmax ≥ 8 mmol/l (Steinacker, Liu & Reissnecker, 2002); (2) HRmax ≥ individual HRmax as determined in a pre-test; RERmax ≥ 1.05; RPEmax ≥ 18; Lacmax = no definition (Tschopp, Held, Villiger, & Marti, 2001); and (3) HRmax ≥ 90% of the predicted HRmax; RERmax ≥ 1.15; RPEmax = no definition; Lacmax ≥ 4mmol/l (Rassouli & Thurnheer, 2015).

Methods:

Eighty-four males underwent medical examination and a cardiorespiratory fitness test on a bicycle ergometer. After a 5-minute warm-up phase at 50 W, workload increased linearly with 25 W/min until exhaustion. Breath-by-breath gas analyses and HR were measured permanently, RPE was recorded every three minutes and blood lactate concentration was determined at exhaustion and three minutes after exhaustion. All tests were carried out according to the guidelines of Tschopp et al. (2001) by the same supervisor. VO₂max was assessed as the highest volume of oxygen uptake over 30 seconds during the cardiorespiratory fitness test. VO₂ was further assessed for the time points when RER reached 1.05, 1.10 and 1.15 and when HR reached 90% and 100% of the predicted HRmax.

Results:

Subjects' median age (interquartile range, IQR) was 23 years (22; 29), body mass was 74 kg (70; 78), and body fat content was 11% (9; 14). Subjects achieved a median maximum workload (IQR) of 400 W (368; 429) and VO₂max of 61 ml/kg/min (56; 66). Regarding the exhaustion criteria, the median HRmax was 191 bpm (187; 197), RERmax was 1.18 (1.15; 1.22), RPEmax was 20 (20; 20) and Lacmax was 14.1 mmol/l (12.6; 15.9). At RER=1.05 the median VO₂ (IQR) was 54 ml/kg/min (50; 60), at RER=1.10 it was 57 ml/kg/min (53; 63), and at RER=1.15 it was 59 ml/kg/min (55; 54). At 90% and 100% of the predicted HRmax the median VO₂ (IQR) was 47 ml/kg/min (41; 53) and 58 ml/kg/min (50; 63), respectively. A total of 16/84 subjects did not reach RER=1.15, 13 did not reach 100% of the predicted HRmax and one did not reach Lacmax ≥ 10 mmol/l. All 84 subjects reported RPEmax ≥ 19 and reached RERmax ≥ 1.10 as well as HRmax ≥ 95% of the predicted HRmax.

Discussion:

Exhaustion criteria may be raised to accept exhaustion only when all of the following four criteria are fulfilled (without taking the risk to declare subjects as not exhausted although they truly are): HRmax ≥ 95% of the predicted HRmax, RERmax ≥ 1.10, RPEmax ≥ 19 and Lacmax ≥ 10 mmol/l. Because measuring VO₂max with sufficient rigour is crucial in intervention studies with baseline and follow up measurements of VO₂max, this might help to maximise signal-to-noise ratio.

References:

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Einfluss des Trampolinsprungtuchs auf Sprunghöhe, Reaktionskräfte und Vertikalbeschleunigung an der Brustwirbelsäule**Autor/innen:** Kredel R¹, Eisele A², Riehle H²¹Institut für Sportwissenschaft, Universität Bern, Schweiz²Fachgruppe Sportwissenschaft, Universität Konstanz, Deutschland**Einleitung:**

Die 2011 für das Trampolinturnen eingeführte, instrumentierte Bewertung der Sprunghöhe hatte eine Entwicklung wurfstärkerer Trampoline und Sprungtücher zur Folge. Im Rahmen eines durch den Deutschen Turnerbund und die Fédération Internationale de Gymnastique geförderten Kooperationsprojektes soll anhand vergleichender biomechanischer Analysen u.a. untersucht werden, inwieweit sich die Sprunghöhen, die auftretenden Reaktionskräfte und die Beschleunigungen während der Tuchkontaktphase verändert haben. Ziel ist die Quantifizierung von Belastung und Beanspruchung des Bewegungsapparates, um Hinweise auf mögliche Überbeanspruchungen zu erhalten.

Methode:

Im Rahmen einer ersten Messreihe wurde das Kraftübertragungsverhalten der verwendeten Trampoline und Sprungtücher mit im Rahmen der Normprüfung verwendeten Stahlkugelfalltests bestimmt. In einer zweiten Messreihe wurden während der Tuchkontaktphasen die Kinematik der Körper- und Wirbelsäulensegmente von Athlet/innen des deutschen Nationalkaders (2 weiblich, 6 männlich) mit einem 10-Kamera Vicon-T40s-System (500 Hz) aufgezeichnet sowie zeitgleich die Bodenreaktionskraftverläufe mit vier Kistler-Kraftmessplatten (2000 Hz) und die Beschleunigungen auf Höhe der Brustwirbelsäule (BWS) mit einem Beschleunigungssensor (myon AG) erfasst. Die Athlet/innen absolvierten identische standardisierte Sprünge und Sprungkombinationen verschiedener Komplexität sowohl auf einem 6x4mm- als auch auf einem 4x4mm-Sprungtuch.

Resultate:

Erste Analysen zeigten, dass sich die Zunahme der Sprunghöhe auf dem 4x4-Tuch notwendigerweise in einem größeren Kraftstoss begründet, dieser aber nicht durch eine längere Tuchkontaktzeit, sondern durch eine höhere Kraft zustande kommt (Kredel, Eisele, Schweizer, Kuhn & Riehle, 2014). Die Analyse von 102 Standsprüngen zeigt Zusammenhänge zwischen der erreichten Sprunghöhe und sowohl der mittleren (4x4: $y=4.2x+22.6$, $R^2=0.66$; 6x4: $y=4.5x+22.4$, $R^2=0.78$), als auch der maximalen (4x4: $y=11.5x+36.4$, $R^2=0.81$; 6x4: $y=8.8x+57.8$, $R^2=0.71$) Vertikalbeschleunigung der Brustwirbelsäule während der Tuchkontaktphase. Bleiben die Beschleunigungswerte im mittleren Sprunghöhenbereich bei beiden Tüchern in ähnlichen Größenordnungen, fällt auf, dass die durch das 4x4-Tuch erreichten größeren Sprunghöhen nicht nur einen Anstieg der mittleren, sondern auch eine weitere Erhöhung der maximalen BWS-Vertikalbeschleunigung zur Folge haben (4x4: 151.4m/s^2 vs. 6x4: 139.6m/s^2).

Diskussion:

Aktuell wird diese Zunahme der maximalen Belastung bei den komplexeren Sprüngen verifiziert und anhand einer inversdynamischen Modellierung des Bewegungsapparates während des Tuchkontakts untersucht, welchen Einfluss diese auf die Beanspruchung von besonders relevant erachteten Strukturen (Sprunggelenk, Kniegelenk, LWS, BWS) hat. Neben diesen modellbasierten Hinweisen auf Überbeanspruchungen des Bewegungsapparates könnten aus der identifizierten Belastungszunahme eine Steigerung der Prävalenz der belastungsbedingten Inkontinenz bei Trampolinturner/innen folgen (Eliasson, Edner, & Mattsson, 2008), die aktuell durch Befragungen aktiver Trampolinturner/innen erhoben wird.

Literatur:

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Kredel, R., Eisele, A., Schweizer, L., Kuhn, M. & Riehle, H. (2014). Einfluss des Trampolinsprungtuchs auf Sprunghöhe und Kontaktzeit. In L. Maurer, F. Döhning, K. Ferger, H. Maurer, M. Reiser & H. Mueller (Hrsg.), *Trainingsbedingte Veränderungen - Messung, Modellierung und Evidenzsicherung* (S. 92). Hamburg: Feldhaus.

Präzisionsleistungen im Luftgewehrschiessen: von der Problemidentifikation zum Trainingssystem**Autor/innen:** Kredel R¹, Tartaruga D²¹Institut für Sportwissenschaft, Universität Bern, Schweiz²Swiss Shooting, Schweizer Schiesssportverband, Schweiz**Einleitung:**

Der vorliegende Beitrag beschreibt einen problemorientierten Zugang zur Aufklärung von Präzisionsleistungen im Olympischen Luftgewehrschiessen (OLS). In mehreren, von Swiss Olympic und der ESK geförderten Kooperationsprojekten zwischen Swiss Shooting und dem ISPW Bern wurde in den Jahren 2010-2013 ein OLS-Messplatz entwickelt und evaluiert, mit dem Merkmale und Ursachen der Präzisionsleistungen Schweizer (Nachwuchs-)Kaderathlet/innen erfasst werden können (Kredel et al., 2013). Im Vergleich zu bisherigen Arbeiten zum OLS liegt die Besonderheit des gewählten Ansatzes darin, dass eine komplette Wirkungskette in den Blick genommen wird und sich die Analysen mithin nicht auf blosse Zusammenhänge zwischen potentiellen „distalen“ Einflussgrößen (bspw. Herzfrequenz) und summativen Leistungskennziffern (bspw. Schussresultat in Ringen) beschränken, sondern dass Abweichungen vom Zielscheibenzentrum aufgrund der aktuellen Position und Ausrichtung des Gewehrs auf vom Athleten ausgeübte Kontaktkräfte und -momente zurückgeführt werden (im Weiteren als „proximale“ Parameter bezeichnet). Die vollständige Betrachtung der Wirkungskette wird als relevant erachtet, da sich Fehler aufgrund „distaler“ Varianzen keineswegs linear über die folgenden Schritte fortpflanzen müssen und stattdessen von Interaktionswirkungen auszugehen ist.

Methodik:

Zur Erfassung der „proximalen“ Parameter wurde ein sensor-instrumentiertes Gewehr entwickelt und in den Messplatz integriert. Zusätzlich wurden – neben „distalere“ Variablen wie bspw. dem Herzschlag – Bewegungsdaten der Zielpunktschwankungen auf der Scheibe (Scatt) und eines Ganzkörpermodells mit Fokus auf Füße, Arme und Gewehrposition (Vicon) erhoben. Während der Datenerhebung führten gesamthaft 24 Athlet/innen Serien von 60 bzw. 90 Schüssen aus, deren Parameterausprägungen auf Merkmale der zentralen Tendenz und der Dispersion hin untersucht wurden. Den Athlet/innen wurden intraindividuelle Parameterunterschiede in Abhängigkeit der Schussleistung für ihr weiteres Training rückgemeldet. Zudem wurden gruppenbasiert die Mittelwertunterschiede der Parameterausprägungen besserer und schlechterer Athlet/innen analysiert (geplante t-Tests; Expertiseinteilung (Elite / Near-Elite) aufgrund der mittleren Dreijahresbestleistung 2011-13).

Resultate:

Fokussiert man in einem ersten Schritt auf die „proximalen“ Parameter, so zeigt sich, dass die Near-Elite-Gruppe stärkere Seitenkräfte auf die Schulterkappe ausübt, $t(14.1)=3.86, p<.01$, und zudem in der Anpresskraft an der Schulterkappe, $t(10.8)=3.73, p<.01$, sowie in der Kippmomentausübung stärker streut als die Elite-Gruppe, $t(12.5)=3.28, p<.01$. Ein ähnliches Bild zeigt sich für alle weiteren Streuungsunterschiede der Kraft- und Drehmomentwerte in der Schulterkappe (alle t 's >2.2 , alle p 's $<.04$). Somit scheint – neben den individuellen Trainingsempfehlungen – eine Trainingsintervention zur Seiten-, Anpresskraft- und Kippmomentreduktion an der Schulterkappe sowie zur Kraftstreuungsreduktion ein sinnvoller Ansatzpunkt für die weitere trainingswissenschaftliche Begleitforschung zu sein.

Diskussion:

In der Folge der erhaltenen Resultate wurden in 2015 vier Schweizer Elite-Schütz/innen mit Messgewehren ausgestattet und in fünf Komplettdiagnostikterminen sowie individuell begleiteten Messplatz-Trainingsphasen auf die Olympischen Spiele 2016 in Rio de Janeiro vorbereitet (Kontrollgruppe: vier Elite-Schütz/innen allein mit Komplettdiagnostikterminen). Nach den Olympischen Spielen 2016 ist eine fortlaufende Nutzung des Messplatz-Systems vorgesehen, zum einen weiterhin im Schweizer Spitzensport, zum anderen und darüber hinaus im Nachwuchsleistungssport, (u.a.) in der Form einer permanenten Integration in die Regionalen und Nationalen Swiss-Shooting-Leistungszentren.

Literatur:

Kredel, R., Tartaruga, D., Siegenthaler, R., & Hossner, E.-J. (2013). *Präzisionsleistungen im Olympischen Luftgewehrschiessen*. Unveröffentlichtes Poster: Trainertagung Magglingen.

Behavioral adaptations to an external focus of attention are accompanied by changes in the primary motor cortex**Authors:** Kuhn Y-A¹, Keller M¹, Ruffieux J¹, Taube W¹¹Movement and Sport Sciences, Department of Medicine, University of Fribourg, Switzerland**Introduction:**

Although it is well established that an external focus of attention (EF) contrasted to an internal (IF) or neutral focus of attention enhances motor performance and motor learning, little is known about the neural mechanisms underlying these behavioral improvements. This study therefore aimed to i) clarify whether the focus of attention (EF vs. IF) influences the motor performance when executing identical tasks and ii) outline differences in activity of the primary motor cortex (M1). For this purpose, subthreshold transcranial magnetic stimulation (subTMS) was used as this technique is known to inhibit ongoing motor cortical output without affecting spinal structures (Davey, Romaiguere, Maskill, & Ellaway, 1994; Lazzaro et al., 1998). Thus, differences in subTMS-induced EMG suppression between an EF and an IF indicate distinct activity in M1.

Methods:

In experiment 1, participants (n=14; 22-33 years; 6 women) were asked to perform an index finger abduction (30 % MVC) until task failure under two different focus of attention conditions (IF vs. EF). In experiment 2, a subTMS protocol was completed to compare the activity of M1 during EF and IF. Ten out of the 14 subjects performed the same motor task as in experiment 1 but with lower forces (10 % MVC). EMG suppression in FDI evoked by subTMS (mean stimulation intensity: 77.85±1.36 % of active motor threshold) was calculated as the difference in the area below the rectified EMG with and without stimulation (cumulative trapezoidal numerical integration).

Results:

When subjects performed the biomechanically identical tasks with an EF, the time to task failure was significantly prolonged compared to an IF ($t_{13} = -2.73, p = 0.01$). Subthreshold TMS resulted in a significantly bigger suppression of EMG activity in the EF condition compared to the IF condition ($t_9 = -4.32, p = 0.001$). Background EMG prior to stimulation was comparable in all conditions ($F_{3, 40} = 0.05, p = 0.98, \eta^2 = 0.006$).

Discussion:

This study was the first to examine the effect of verbal instructions regarding the focus of attention (IF vs. EF) on neural processing using a within-subjects design. In line with the literature, adopting an EF resulted in a prolonged time to task failure. This behavioral effect was accompanied by a different neural activation within M1, manifested in a bigger EMG suppression induced by subTMS in the EF condition. Previous fMRI studies have shown an enhanced level of activity within M1 when adopting an EF (Zentgraf et al., 2009) what is well in line with the present data. As levels of background EMG activity in our study did not differ between EF and IF, we argue that the focus of attention was the dominant modulatory influence on EMG suppression induced by subTMS. From this perspective, the bigger inhibition of the ongoing EMG activity suggests that the cortical involvement was greater in the EF condition. Thus, it can be concluded that activity within M1 is modulated depending on the focus of attention.

References:

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- Zentgraf, K., Lorey, B., Bischoff, M., Zimmermann, K., Stark, R., & Munzert, J. (2009). Neural correlates of attentional focusing during finger movements: A fMRI study. *Journal of Motor Behaviour*, 41(6), 535-541. doi:10.3200/35-08-091

Aging effects on single-leg standing balance performance strategies**Authors:** Kurz E^{1,2}, Faude O¹, Roth R¹, Zahner L¹, Donath L¹¹Department of Sport, Exercise and Health, University of Basel, Basel, Switzerland²Clinic for Trauma, Hand and Reconstructive Surgery, Division of Motor Research, Pathophysiology and Biomechanics, Jena University Hospital, Jena, Germany**Introduction:**

The majority of studies that investigated effects of biological aging on balance performance included adults and seniors. Children were rarely considered. Ankle muscle coordination can rely on modulation of agonists' activation and co-activation of opposed muscles. While increasing active joint stiffness by higher co-activation constrains postural deviations (Warnica et al., 2014), a small amount of sway is accepted through muscle activation modulation. Thus, the present study aimed at examining aging effects on postural strategies during standing balance in healthy and active children, adults and seniors.

Methods:

Seventy-eight voluntarily participating children (10 boys, 9 girls, age: 9-10 years), adults (20 males, 10 females, age: 20-25 years) and seniors (16 males, 13 females, age: 53-79 years) were recruited. Standing balance was measured via 30 s of single-leg stance at the dominant leg while standing on a force plate (GK-1000, Mittweida). The best trial (lowest total center of pressure (COP) path length displacement) was considered for further analyses. The velocity (COPv) of COP displacements served as an outcome measure of standing balance performance. Corresponding Surface EMG (Imago, Freiburg) data of the selected trials were used to characterize tibialis anterior (TA) and soleus (SO) muscle activation and co-activation (Talis et al., 2008). Muscle activation is expressed as the coefficient of variation (sd/mean×100) of the EMG envelope. Age-group effects on outcome variables were verified using a multivariate analysis of variance (MANOVA). To estimate practical relevance, effect sizes (partial eta squared, η_p^2) were calculated. Tukey-HSD post hoc tests were carried out to verify group differences.

Results:

The initial MANOVA revealed a large effect ($F = 8.6$, $p < 0.001$, $\eta_p^2 = 0.32$) of age- group on the four outcome variables. Subsequent univariate F tests found the effects to be significant for COPv ($F = 19.5$, $p < 0.001$, $\eta_p^2 = 0.34$), TA ($F = 9.8$, $p < 0.001$, $\eta_p^2 = 0.21$), SO ($F = 6.4$, $p < 0.01$, $\eta_p^2 = 0.15$) and for TA over SO ($F = 15.7$, $p < 0.001$, $\eta_p^2 = 0.30$). Follow-up post hoc comparisons indicated significant differences between children (12 mm/s (3), mean (SD)) and adults (9 mm/s (2)), adults and seniors (15 mm/s (5)) as well as seniors and children ($p < 0.02$). For TA over SO, both children and seniors differed from lower adults' levels ($p < 0.001$). TA modulation was significantly higher in children and adults as compared with seniors ($p < 0.002$), whereas SO modulation revealed lowest values in adults which differed from children only ($p = 0.002$).

Discussion:

Prepubescent children's neuromuscular capacities, among others, are not fully developed. In contrast, aging is known to affect neuromuscular performance in seniors. Our age-related results of postural steadiness (COPv) and ankle muscle co-activation confirm this u-shaped association. Children and adults use mainly activation modulation of TA to correct postural deviations, whereas seniors' TA capacity is diminished. Increased postural sway is compensated by children through a more flexible neuromuscular system. Aging was mainly characterized via reduced TA modulation in seniors. Thus seniors presumably use higher total activity of shank muscles and/or proximal strategies to realize difficult postural tasks like single-leg stance.

References:

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- Warnica, M. J., Weaver, T. B., Prentice, S. D., & Laing A. C. (2014). The influence of ankle muscle activation on postural sway during quiet stance. *Gait and Posture*, 39(4), 1115-1121.

Leistungsentwicklung im Schneesport durch gezielte Forschung

Organisator/innen: Läubli P¹

¹Swiss-Ski, Muri bei Bern, Switzerland

Struktur:

Leistungsverbesserung ist das oberste Ziel eines erfolgreichen Sportverbandes. Das heisst, man muss die Erfolgsfaktoren laufend beobachten und optimieren, der Verband muss im Rahmen der Sportartenanalyse, die Weiterentwicklung der Sportart im Auge behalten und mit den Forschungsinstitutionen optimal zusammenarbeiten. Nur wenn man beide Interessen verknüpfen kann, entstehen leistungsorientierte Forschungsprojekte.

Am Beispiel der Forschungsgruppe von Swiss-Ski zeigen wir auf (Läubli), dass in der Schweiz mit optimalem Einsatz der Ressourcen, erfolgreich Forschung betrieben werden kann. Es gilt die Fragen der Sportart gezielt beantworten und Forschungsergebnisse als Basis für Lehrmittel nutzen. Wie das bei Swiss-Ski funktioniert, möchten wir (Herzig) an Praxisbeispielen aufzeigen. Mit Grundlagenforschung (Kredel, Grimm, Hossner) Wissenssicherheit erzeugen, mit Ursachenforschung (Lorenzetti) Stossrichtungen definieren und mit praxisorientierter Forschung (Bruhin und Rhyner) Leistungen optimieren. Der grösste Erfolgsfaktor für eine Leistungsverbesserung durch gezielte Forschung, ist aber nach wie vor die gute Idee für die Fragestellung, diese ermöglicht erst eine durchschlagende Antwort!

Beiträge:

- (1) Läubli P (Swiss-Ski)
Das System „Forschungsgruppe Swiss-Ski“, erfolgreiche Forschung im Sinne des Spitzensports
- (2) Herzig R (Swiss-Ski)
Forschung zur sportartspezifischen Biomechanik als Stütze der technischen Ausbildung
- (3) Kredel R, Grimm A, & Hossner E-J (Universität Bern)
Visuelle Wahrnehmungsleistung und Dämpfungskompetenz im Skirennsport
- (4) Lorenzetti S (ETH Zürich)
Swiss-Ski Power Test and race performance as determinants for the knee injury risk in alpine ski racing
- (5) Bruhin B (Rehaklinik Bellikon, Paralympic Ski Team)
Druckmesssohlenmessungen eines körperbehinderten Weltklasse-Athleten in einem Riesenslalom-Trainingslauf
- (6) Rhyner H (Schweizerisches Institut für Lawinenforschung und Schnee, Davos)
Sochi Snow

(for the contributions to the interdisciplinary session, there are no individual abstracts available)

Biomechanics of squats, drop jumps and imitation jumps of ski jumpers**Authors:** Lorenzetti S¹, Ammann F²¹Institute for Biomechanics, ETH Zurich, Switzerland²Swiss-Ski, Muri bei Bern, Switzerland**Introduction:**

The training on the hill is extremely time consuming. Furthermore only few jumps per training unit can be performed. Therefore other training regimes are required. The strength and conditioning programs of ski jumpers include amongst other exercises, squats, drop jumps and imitation jumps. These exercises should enhance the force and for the sport required specific skills. Due to the kinetic and kinematic nature of the squat it is obvious that this exercise is close to the sport specific task. However it is unknown which biomechanical parameter are related with the performance during competition. Therefore it was the aim of this work to analyze kinetic and kinematic parameters of squat, drop jumps and imitation jumps and their correlation to the results of the competitions in the summer 2012.

Methods:

1 female and 9 male top end ski jumpers (healthy, 23±4 y, 179±5 cm, 64.6±4.8 kg) of Switzerland performed two sets of squats (actual training weight and 70% 1RM), drop jumps (from 74cm) and imitation jumps (10 with the help of a coach) in a human motion analysis lab (IfB, ETHZ). Kinetic data was acquired using Kistler force plates and kinematic data was gathered using the IfB marker set with 83 skin markers and a Vicon motion capture system. The performance during competition was based upon the Swiss Ski scoring table. A correlation analyses was performed with the biomechanical parameters and the performance score.

Results:

For the imitation jumps the highest correlation ($R=0.718$) was observed for the vertical take-off velocity. Interestingly, the more the athletes moved their knees towards valgus during imitation jumps ($R=0.729$) and squats (0.685) the lower is the performance score.

Discussion:

In this work it was not possible to analyze the knee position during ski jumping on the hill. However these results suggest that proper knee alignment during strength and conditioning program should be improved in order to enhance the performance during competition.

References:

Pauli, C., Keller, M., Ammann, F., Hübner, K., Lindorfer, J., Taylor, W. R., & Lorenzetti, S. (2015). Kinematic and kinetic of squat, drop jumps and imitation jumps of ski jumpers. *Journal of Strength and Conditioning Research, Published Ahead of Print*. DOI:10.1519/JSC.0000000000001166

Applying the selective improvement hypothesis to educational settings: Effects of running exercise on inhibitory control, working memory and long-term memory in university students attending a seminar**Authors:** Ludyga S¹, Colledge F¹, Gerber M¹, Pühse U¹¹Departement für Sport, Bewegung und Gesundheit, Universität Basel, Schweiz**Introduction:**

The selective improvement hypothesis suggests that performance on executive function is increased following an exercise bout, whereas other cognitive domains remain unaltered. Evidence suggests that especially aerobic exercise of moderate intensity elicits temporary benefits on higher cognitive functions (Chang, Labban, Gapin, & Etnier, 2012). Unfortunately, the selective improvement hypothesis has mainly been investigated in laboratory settings, so that the practical relevance is still questionable. Therefore, the present study aimed to examine acute effects of running exercise on executive function and long-term memory in a university seminar.

Methods:

Using a cross-over design, 18 university students attended a seminar after 20 min moderate running exercise and after reading an academic text. The order of the conditions was counter-balanced and randomized across participants. Immediately after both conditions a 20-item word list was presented. Participants were then asked to recall as many words as possible after 2 min (immediate recall) and after listening to a lecture on exercise science (delayed recall). The word lists were standardized and matched for imagery and concreteness of the words. Additionally, inhibitory control and working memory were assessed using computer-based versions of the Flanker-Task and nBack-Task, respectively.

Results:

Regarding executive function measures, the statistical analysis revealed main effects of condition ($F=5.87$; $p=0.027$) and congruency ($F=52.2$; $p\leq 0.001$) on reaction time in the Flanker-Task. Furthermore, the percentage of correct recalls was different between conditions ($F=11.3$; $p=0.004$) and between immediate and delayed recall tasks ($F=21.9$; $p\leq 0.001$).

Discussion:

Whereas a higher inhibitory control was confirmed after running exercise, participants' working memory was not altered. This indicates that moderate aerobic exercise does not influence different executive function components after a seminar in a similar way. As long-term memory performance was also increased in the running exercise condition, acute benefits of aerobic exercise seem not to be limited to executive functions only. Thus, the selective improvement hypothesis is not fully supported in an educational setting.

References:

Chang, Y. K., Labban, J. D., Gapin, J. I., & Etnier, J. L. (2012). The effects of acute exercise on cognitive performance: A meta-analysis. *Brain Research, 1453*, 87-101.

Does the neural efficiency hypothesis apply to cyclists performing an exercise bout?

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Introduction:

Originating from intelligence research, the “neural efficiency” hypothesis assumes that experts with high cognitive performance are characterized by a more efficient cortical function particularly in the frontal brain region (Basten, Hilger, & Fiebach, 2015). Although this hypothesis has been extended to a variety of tasks requiring movements in response to visual stimuli, it is unclear whether or not neural efficiency is present in cyclists performing endurance exercise. Therefore, this study examined brain cortical activity at rest and during exercise between cyclists of lower and higher aerobic fitness.

Methods:

In a laboratory setting, male (n=18) and female participants (n=11) performed a graded exercise test with spirometry to assess maximal oxygen uptake. After 3 to 5 days, EEG was recorded at rest with eyes closed and during cycling at the individual anaerobic threshold over a 30 min period. Possible differences in alpha/beta ratio as well as alpha and beta power at frontal, central, and parietal sites were investigated in cyclists with lower (LOW; n=15; 46.4 ± 4.1 mL/min/kg) and higher aerobic power (HIGH; n=14; 55.6 ± 2.8 mL/min/kg).

Results:

The statistical analysis revealed significant differences between groups (F=12.04; p=0.002), as the alpha/beta ratio was increased in HIGH compared to LOW in both the resting state (p=0.018) and the cycling exercise condition (p=0.025). Furthermore, frontal alpha/beta ratio explained 57 % of the variance in cortical activity during exercise.

Discussion:

Cyclists with higher aerobic power compared to peers with less aerobic power are able to complete submaximal cycling exercise with a lower level of brain cortical activity. This indicates enhanced neural efficiency in cyclists with higher aerobic power, possibly due to the inhibition of task-irrelevant cognitive processes.

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Fachdidaktisches Wissen und Können von Sportlehrpersonen

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Einleitung:

Die Studie PCK-Sport untersucht das fachdidaktische Können von angehenden Sportlehrpersonen während der Ausbildungszeit um dadurch Erkenntnisse für die Wirksamkeit der Sportlehrerausbildung zu machen.

Methodik:

In einem ersten Schritt wurde durch eine Delphi-Befragung ein Kompetenzmodell für das *pedagogical content knowledge* (PCK) entwickelt. Um die Performanz der Kompetenzen für die Berufspraxis sicher zu stellen, wurden die einzelnen Faktoren durch Text-Vignetten ergänzt. Diese Textbausteine zeigen *critical incidences* aus realen Unterrichtssituationen auf und sind nach dem Prinzip der maximalen Kontrastierung dem eigenen Fallarchiv (sportdidaktik.ch) entnommen. Das Modell und die entwickelten Testinstrumente konnten in einem nächsten Schritt im Rahmen einer Vergleichsstudie genutzt werden, um Entwicklungen der verschiedenen Dimensionen des fachdidaktischen Könnens während der Ausbildung zu untersuchen sowie Erkenntnisse über die Unterschiede des fachdidaktischen Könnens in verschiedenen Phasen der Ausbildung, bei verschiedenen Zielstufen und Ausbildungsgängen (Sek I und Sek II) zu gewinnen.

Resultate:

In der Dimension „mit SchülerInnen interagieren“ zeigen sich insbesondere für die Untersuchungsgruppe der Studienbeginner mit der Zielstufe Sek I signifikante Unterschiede zu den anderen untersuchten Gruppen (Sek II Abschliessende, erfahrene Berufspersonen). Sek II Beginner weisen im Durchschnitt der Rangwerte eine höhere fachdidaktische Kompetenz (PCK) auf, als die Gruppe der erfahrenen Berufspersonen. Auf Ebene der Faktoren konnte die Untersuchung eine überzufällige Verbesserung der fachdidaktischen Kompetenzen von Studienbeginnern der Zielstufe Sek I zu den Studienabschliessenden derselben Stufe, aber auch im Vergleich zu anderen Untersuchungsgruppen aufzeigen. Auf der Zielstufe Sek II ist dieser Effekt nicht nachweisbar. Das unterschiedliche Bild lässt sich wahrscheinlich auf den unterschiedlichen Aufbau der Studiengänge Sek I (integriert) und Sek II (konsekutiv) und die deutlich längere Ausbildungszeit zurückführen. Die Unterschiede zeigen sich insbesondere bei den Faktoren „Zeit und Personen organisieren“, „Körperlichkeit beachten“, „auf Unterschiede achten“. Letzterer weist auf die didaktische Kompetenz des Differenzierens hin. Die in der Untersuchung festgestellten signifikanten Unterschiede des PCKs zwischen den einzelnen Untersuchungsgruppen weisen demnach auf nicht erwartete Defizite in der Ausbildungspraxis, aber auch auf strukturelle Differenzen hin.

Diskussion:

Die empirischen Resultate der Faktorenanalyse weisen darauf hin, dass sich in zahlreichen von den Experten als wichtig bezeichneten fachdidaktischen Kompetenzen keine Performanz der Ausbildung nachweisen lässt. Hier weist die Untersuchung auf Defizite der Ausbildungspraxis hin, aber auch auf überhöhte normative Erwartungen an diese Ausbildung.

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Changes in intracortical inhibition in response to balance training

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Introduction:

The adequate development of intracortical inhibitory processes seems crucial for an intact motor control. With respect to balance, it was previously shown that both healthy young and old adults decrease intracortical inhibition when they perform challenging postural tasks (Papegaaij et al., 2015). However, the level of intracortical inhibition is generally lower in old adults who – at the same time – display worse balance skills than young subjects (e.g. Papegaaij et al., 2014). Therefore, we asked the question whether balance training is suited to increase the short-interval intracortical inhibition (SICI) during the performance of challenging postural tasks.

Methods:

For this purpose, a training group of 13 young adults (age: mean \pm SD = 21 \pm 5) practiced 6 trainings of 1 hour on a movable platform. Subjects were instructed to stand with both feet on the platform and to keep it in a horizontal position as long as possible during 30s. Transcranial magnetic stimulation (TMS) was used to measure neurophysiological adaptations before and after the training. Two pulses with an interstimulus interval of 2.5ms were elicited with TMS in order to assess SICI during two postural tasks: standing on a movable platform that was secured with elastic straps (straps) or was freely moving (free). During each postural task 20 single and 20 paired pulses were elicited by TMS. Motor evoked potentials (MEPs) were recorded in the soleus (SOL) and tibialis (TA) muscles. A two-way repeated measure-ANOVA was executed for SICI with TIME (pre, post), MUSCLE (SOL, TA) and POSTURAL TASK (straps, free) as factors.

Results:

The balance training on the movable platform resulted in significant performance improvements (main effect of TIME: ($F_{1, 11} = 77.4$; $p < 0.01$). Time in balance increased from 15.7 \pm 1.6s (mean \pm SEM) to 28.8 \pm 1.3s after the training. Analysis of the SICI data displayed a significant main effect for TIME ($F_{1, 10} = 5.7$; $p = 0.04$). For both, TA and SOL there was an increase in the amount of SICI (TA: +29%; SOL: +23%). Moreover the increase of balance performance was correlated to an increase of intracortical inhibition ($r = -0.702$, $p = 0.024$).

Discussion:

The purpose of this study was to evaluate whether a balance training induced changes in the intracortical inhibition during different postural tasks. In summary, two weeks of balance training significantly improved postural skills in young adults. At the same time, SICI was increased in both muscles and was correlated to an increase of balance performance. This is an important finding as it shows for the first time that SICI processes can be increased by balance training. Several studies on motor training reported a reduction of SICI. However, with respect to postural control, the decrease of balance performance was correlated to reduction of SICI (Papegaaij et al., 2014). A previous study did not find changes in SICI amplitudes after a balance training (Beck et al., 2007), but SICI was measured at rest and not during a balance task. In the current study, results showed that improvement in balance performance is related to an enhancement of intracortical inhibition, which suggest that underlying neural adaptations may also occur in the inhibitory process.

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Sportverbandsentwicklung bei Swiss Orienteering

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Einleitung:

Nationale Sportverbände in der Schweiz sind aktuell mit einer Reihe von Herausforderungen konfrontiert. Im Spitzensport erfordert die stetig wachsende internationale Konkurrenz die Weiterentwicklung der bestehenden Förderkonzepte und -strukturen. Der Veränderungsdruck verstärkt sich in der Regel durch externe Stakeholder (z.B. Swiss Olympic, Sponsoren, Medien), die die Gewährung finanzieller Unterstützung an bestimmte Erwartungen koppeln. In der Breitensportförderung sind Verbände zunehmend mit gesellschaftspolitischen Ansprüchen konfrontiert (z.B. Integration von sozial benachteiligten Bevölkerungsgruppen), die ohne strategische Konzepte, hauptamtliches Personal und moderne Managementmethoden kaum noch zufriedenstellend bewältigt werden können. Swiss Orienteering hat sich mit ähnlichen Problemlagen auseinanderzusetzen und durchläuft derzeit einen Prozess der Verbandsentwicklung, beim dem insbesondere folgende Fragestellungen im Raum stehen: Wie können nach der Einrichtung einer Geschäftsstelle 2007 und deren Entwicklung bis heute die Aufgaben und Rollen des ehrenamtlichen Zentralvorstandes und der hauptamtlich Mitarbeitenden periodisch überprüft und neu definiert sowie strategische und operative Bereiche sinnvoll abgegrenzt werden? Wie lassen sich die durch einen Sponsor finanzierten Personalstellen auch nach seinem Ausstieg nachhaltig finanzieren? Wie sehen die Mitgliedsorganisationen (Regionalverbände, Vereine) die geplanten Veränderungen der Verbandsstruktur unter Berücksichtigung ihrer Entscheidungskompetenz an der Delegiertenversammlung?

Methode:

Diese bei der Verbandsentwicklung aufgetretenen Fragen wurden im Rahmen des SNF-Projekts „Professionalisation of Sport Federations in Switzerland“ (Projektleitung E. Bayle Uni Lausanne und S. Nagel Uni Bern) in einer spezifischen Fallstudie bearbeitet. Die entsprechenden Analysen waren dabei zusätzlich in das im FS2015 durchgeführte forschungsorientierte Masterseminar „Management in Sportorganisationen“ eingebunden. Dabei haben die Studierenden – mit Unterstützung der forschenden Dozierenden und im Austausch mit den Verantwortlichen von Swiss Orienteering – (1) auf der Grundlage der existierenden Literatur zum Management und zur Professionalisierung von Sportverbänden eine Soll-/Ist-Analyse der Aufbaustruktur des Verbandes durchgeführt und (2) im Rahmen einer Befragung der Mitgliedsvereine deren Bewertung der bisherigen Verbandsentwicklung und Erwartungen an den geplanten Professionalisierungsprozess untersucht.

Resultate:

Die entsprechenden Ergebnisse und Handlungsempfehlungen wurden nicht nur mündlich präsentiert und mit der Verbandsführung diskutiert, sondern auch im Verbandsmagazin den Mitgliedern kommuniziert. Daneben ist geplant, auf der Grundlage der Fallstudie mit Swiss Orienteering einen wissenschaftlichen Artikel zur Frage der Sportverbandsentwicklung und damit verbundener Entscheidungsprozesse und hierbei relevanter Akteure zu publizieren.

Diskussion:

Abschliessend lässt sich festhalten, dass es bei der Bearbeitung des dargestellten Problems aus der Sport(organisations)praxis gelungen ist, eine dreifache Win-Situation zu generieren. Der Verband Swiss Orienteering hat durch die Einbindung in den Forschungs- und Lehrkontext wertvolle Analysen für den aktuellen Prozess der Verbandsentwicklung erhalten. Die Studierenden haben einen Einblick in die Verbandspraxis und die Möglichkeit bekommen, die Analysephase eines Prozesses der Organisationsentwicklung aktiv mitzugestalten. Die Forschungsgruppe des ISPW kann für die weitere wissenschaftliche Auseinandersetzung mit der Frage der Professionalisierung von Sportverbänden von der Fallstudie mit Swiss Orienteering profitieren.

Why do we stop exercising? Insights from task failure of sustained isometric contractions

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Introduction:

Over the last decades, several theories have been brought forward to explain the causes of task failure (TF, i.e. the inability to continue an exercise at a given intensity). If most of the authors in the field recognize an implication of the central nervous system in TF, an important debate still exists regarding the primary etiology of the mechanisms leading to task termination. As no consensus has been reached today regarding the mechanisms responsible for TF, the present work aimed to delve deeper into the mechanisms of TF.

Methods:

To improve our understanding of the causes of TF, the present work integrates the results obtained from two published studies (Neyroud et al., 2012; 2013) and one unpublished study (Neyroud et al. in preparation) using sustained isometric contractions performed with different muscle groups at either 20% of maximal voluntary contraction (MVC) or at 50% MVC force, as fatiguing exercises. In addition, to alter performance, some of the 20% MVC tasks were performed following caffeine ingestion (6 mg/kg body weight) and/or under hypoxic conditions (simulated altitude: 4'000 m – 12% O₂). All studies involved healthy and physically active participants. In total, 39 participants (26 ± 6 years, 74 ± 9 kg) took part in the different studies. MVC forces were measured before and at failure of fatiguing submaximal isometric contractions and their decrease served as an index of neuromuscular fatigue extent.

Results:

At TF of a 20% MVC contraction of the knee extensors, MVC force was reduced by 51 ± 11%. A similar MVC force reduction was observed following the same task performed after caffeine ingestion (-51 ± 17%) or hypoxic conditions (-47 ± 12%) and under both hypoxic exposure and caffeine ingestion (-54 ± 13%). When contraction intensity was increased to 50% MVC, knee extensors MVC force was reduced by 34 ± 15% at TF. Similar MVC force losses were observed at TF of a 50% MVC fatiguing contraction realized with the plantar flexors (-30 ± 11%), the elbow flexors (-40 ± 12%) and the thumb adductor (-37 ± 13%).

Discussion:

In our model of isometric contraction sustained until TF, it appears that MVC force loss is tightly regulated as a given task realized in different conditions or by distinct muscle groups always leads to a similar neuromuscular fatigue extent at TF. The results from the experiments involving a 20% MVC sustained isometric contraction seem to indicate the existence of a *critical fatigue threshold*, i.e. a certain critical extent of MVC force loss that cannot be overpassed. Yet, TF of a 50% MVC sustained contraction was not caused by this critical neuromuscular fatigue threshold as MVC force losses were less than the one observed following the 20% MVC task. Indeed, it appears that a certain *critical neuromuscular reserve threshold* (i.e. a certain critical minimal of additional force that has to be preserved at TF) was reached in that case. Once reached, this threshold would prevent exercise continuation and thus induce TF even if the critical neuromuscular fatigue threshold was not reached yet. Overall, it appears that depending on the exercise intensity either a *critical neuromuscular fatigue threshold* or a *critical neuromuscular reserve threshold* will be reached and causes TF.

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Effects of acute bouts of high-intensity interval training on retinal vessel diameters in seniors and young adults

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Introduction:

Blood flow in retinal arterioles is reduced after maximal exercise. The autoregulated constriction in response to intraluminal pressure peaks increases cerebrovascular resistance and prevents an overshooting of blood flow to the brain, which could potentially lead to haemorrhage (Ikemura & Hayashi, 2012). We have previously shown that the myogenic vasoconstriction of retinal vessels in response to a single continuous maximal exercise bout is impaired in seniors (Nussbaumer et al., 2014). It is important to know whether acute high-intensity interval training HIIT imposes similar age-dependent alterations in retinal vessels, which are part of the cerebral vasculature, compared to maximal exercise. If so, the recommendation for HIIT in seniors would have to be challenged. In this study, we estimated differences in retinal vessel diameters following an acute bout of HIIT compared to an active control condition (CC) between healthy seniors and young adults. We hypothesized that the myogenic vasoconstrictive autoregulation of retinal vessels following HIIT compared to CC is reduced in seniors compared to young adults.

Methods:

Fifteen healthy seniors and 20 healthy young adults performed a HIIT and an active control condition (CC) in randomised order. HIIT consisted of a 4x4 min interval training at 90-95% of the HRmax on the treadmill and CC consisted of a 4x4 min interval-based walking exercise below 50% of HRmax. We measured the central retinal arteriolar (CRAE) and venular (CRVE) diameter equivalent before and 5 (t5), 30 (t30), 60 (t60) minutes after exercise cessation using a static retinal vessel analyser.

Results:

Vascular dilatation following HIIT compared to CC was reduced in seniors compared to young adults for CRAE (-1.0µm (95% CI -6.7, 4.7), -4.3µm (95% CI -10.1, 1.4), -2.4µm (95% CI -8.1, 3.3)) and CRVE (0.1µm (95% CI -4.7, 4.9), -4.2µm (95% CI -9.0, 0.6) and -4.3µm (95% CI -9.2, 0.5)), each at t5, t30 and t60, respectively. HIIT did not induce a myogenic vasoconstriction after HIIT, neither in young adults nor in seniors.

Discussion:

In our study, HIIT – at 90-95% of the HRmax – induced a vasodilatation both in seniors and in young adults. The vasodilatory effects, such as the production of nitric oxide, seem to be the predominant variables during HIIT. The vasoconstrictive Bayliss effect and the hyperventilation-induced hypocapnia do not override the vasodilatory effects. It seems that temporary brief intraluminal pressure peaks during HIIT do not need to be counterregulated by a myogenic vasoconstriction and a reduction of cerebral blood flow. Therefore, the previously detected impairment of the autoregulated vasoconstriction in seniors after maximal exertion does not seem to come into effect during exposure to HIIT. In conclusion, HIIT – as opposed to continuous maximal exercise – does not induce an increase in intraluminal pressure peaks and blood flow in the cerebrovascular bed. With respect to the regulation of the retinal and cerebral microcirculation, the recommendation for HIIT in seniors can be maintained.

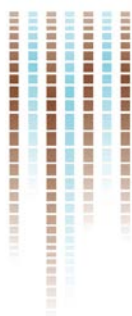
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Is there a relative age effect in paralympic sports? An analysis of three different sport disciplines at the London Paralympic Games 2012

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Introduction:

The influence and advantage of relative age (=born from January to June) in talent development and promotion as well as squad selection is a long known phenomenon and is generally described as relative age effect (RAE). A RAE in able-bodied individuals was reported especially in team sports (e.g. basketball, soccer, ice hockey; Copley et al., 2009; Romann & Fuchslocher, 2013) but also in endurance sports (e.g. biathlon, cross-country skiing; Raschner et al., 2012) and partially even in less physical oriented sports such as shooting (Delorme & Raspaud, 2009). However, different factors point towards the assumption that in Paralympic sports a RAE doesn't exist. The aim of this study was to define the role of RAE in Paralympic sports with regard to relative age and gender in three different sport disciplines representing a typical team, endurance and a less physical oriented sport discipline, respectively.

Methods:

Data of three sports disciplines (wheelchair basketball, cycling and shooting) were collected from the official website of the London Paralympic Games (www.london2012.com). Male and female athletes of each sport discipline were divided in two groups according to their relative date of birth (January-June or July-December). Data were analyzed concerning the relative age distribution in the different sport disciplines as well as related to gender.

Results:

A total of 654 data sets (412 men, 242 women) were analyzed. No differences concerning relative age distribution between the different sport disciplines for men ($p=0.708$) and women ($p=0.434$) were found. In combination with the fact, that 51.7% of all athletes were born from July to December no RAE could be found independent of sport discipline or gender.

Discussion:

In contrast to the already existing literature for able-bodied athletes there seems to exist no RAE in Paralympic sports. It's likely to assume that other factors than the relative date of birth seem to play a more pronounced role to become a Paralympic athlete.

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Modelling of motion and loading of M. gluteus medius during strength training exercises for the hip using cable**Authors:** Plüss M¹, Schellenberg F¹, Lorenzetti S¹¹Institute for Biomechanics, ETH Zürich, Switzerland**Introduction:**

Hip strength deficiencies are assumed to be associated with several injuries of the lower extremities. Since measurements of loading conditions such as muscle and joint contact forces are currently not directly possible, increased effort was put in musculoskeletal simulation to quantify these parameters, albeit indirectly, by means of numerical optimization processes with approaches, like forward dynamics, inverse dynamics and EMG-driven analysis (Schellenberg, Oberhofer, William, & Lorenzetti, 2015). In conventional strength training, the M. gluteus medius (GM) is trained by an abduction/ adduction movement in the frontal plane. However, the influence on the anterior and the posterior part of GM is unknown. Therefore, the purpose of this study was to evaluate the simulated hip strength exercises on the cable machine and to find scientific training recommendations for the anterior and posterior part of GM.

Methods:

A specific cable machine strength exercise for the movement in the frontal plane representing the hip abduction and adduction was simulated with the open source software Opensim (Delp, et al. 2007). The required kinematic inputs of the model were created in Matlab, including a sine shaped movement velocity-time curve, with a maximum movement speed of 40 degrees per second and frequency of 100Hz. The abduction/adduction movement is performed with a starting position at -35 degrees abducted hip and a movement reversal point at 5 degrees of hip adduction. Additionally each of the three following hip rotation configurations were simulated, neutral (0°), internal rotated (40°) and external rotated (-40°). An external force with the magnitude of 100 Newton was applied to the center of a rigidly to the leg attached cylinder, representing the ankle strap. Through the total movement the external force stays parallel to the ground. An initially medial pointing external force was rotated by 15 degrees counterclockwise for every simulation until reaching full rotation. This rotation represents the varying body orientation to the cable machine. The change of the length of the muscle and the muscular activity was evaluated.

Results:

By varying the position toward the cable as well as by changing the hip rotation configuration the loading of the GM could be influenced. The maximal activity (<0.5) in the neutral hip position was at an angle of 345 ° for the posterior part respectively 330° for the anterior part. Using an external hip rotation position, the activity for the posterior part could be raised by a factor of 2. The change of the muscle length was lower compared to the normal position. Similarly for the anterior part here an internal hip rotation position was required to raise the muscle activity by a factor of 2. Here not only the activity but also the change of the muscle length was enhanced. No setting was found that allowed a simultaneous training for the anterior and posterior part with an activity level >0.5.

Discussion:

Both, the rotation position in the hip as well as the direction of the external force do influence the maximal activity and the change of the length of the anterior and posterior part of M. gluteus medius. No efficient exercise for both parts was found. Hence, in order to efficiently train the anterior and the posterior part, two different exercises are required.

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Substance use and misuse in an extreme mountain ultra-marathon**Authors:** Poussel M^{1,2}, Didier S³, Chenuel B¹, Vauthier JC³¹Department of Pulmonary Function Testing and Exercise Physiology, CHRU de Nancy, France²ISSUL, Institute of Sports Sciences, Department of Physiology, Faculty of Biology and Medicine, University of Lausanne, Switzerland³Medical Board of the Infernal Trail des Vosges, Dommartin-les-Remiremont, France**Introduction:**

Endurance and ultra-endurance events have become increasingly popular facing the athlete to extreme physical and mental demands sometimes at the limits of the adaptive response of human physiology (Millet et al., 2012). To prevent pain or to treat injuries considered as minor, endurance athletes frequently take medications in inappropriate indications, doses or even for prolonged periods (Gorski et al., 2011). The aim of our study was to explore the use of medication among endurance athletes participating to the 2014 Infernal Trail des Vosges.

Methods:

All athletes involved in one of the two races (A: 72 km with 3000 positive height gain or B: 160 km with 7300 positive height gain) were invited to complete a specific self-reported electronic questionnaire regarding personal and training data, use of medications before and during the race and knowledge related to medications and side effects. Data were analysed using descriptive statistics, χ^2 test and Fisher's exact test (JMP 11.0.0).

Results:

An overall of 297 questionnaires (76.3% of the competing athletes) were analysed, divided into 163 for the race A (94.5% of men; 56% aged 23-39 years; 88.3% were finisher) and 134 for the race B (97% of men; 45% aged 40-49 years; 59.7% were finisher). Athletes engaged in the race B were older ($p=0.01$), practised endurance since a longer period of time ($p<0.0001$) and more likely dropped out of the race ($p<0.0001$). A total of 77 (27%) athletes used medications the month before the race (12.3% dietary supplements; 9.8% non-steroidal anti-inflammatory drugs (NSAIDs); 6.7% paracetamol). Among athletes using medications apart from a documented chronic pathology, the reasons cited for the consumption were osteo-articular pain relief (29.6%) and pain prevention at training (28.2%). During the race, 56 athletes reported consuming medications (8.4% paracetamol; 5.6% NSAIDs) principally because of osteo-articular pain (71.5%). B athletes showed a higher medication use ($p=0.001$) associated with higher self-medication ($p=0.0005$). Regarding knowledge, only 10.1% of the athletes consider that NSAIDs are without any danger when taken during an ultra-endurance event. Finally, athletes reporting medication use the month before the race, also reported a higher use of overall ($p<0.0001$) and NSAIDs ($p=0.008$) self-medication during the race.

Discussion:

Available studies – but dealing with team-sports - showed a high (>50%) use of NSAIDs and analgesics (Vaso et al., 2015) during sport events. Our study, focusing on a specific population of endurance athlete, showed a far lower use of medications before and during the race. It therefore seems that ultra-endurance athletes behaviours regarding use of medications clearly differ compared to non-endurance athletes. The relative maturity (i.e. age, long experience in endurance sports, knowledge) of these endurance athletes may be an explanation of our contrasting results, further specifically characterising this athletic population. However, education should be further delivered to make athletes aware of the risks and benefits of using medications during ultra-endurance events.

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How does equipment impact on trail-runners' activity? A situated analysis of trail-runners' experience of running with carrying systems**Authors:** Rochat N^{1,2}, Seifert L², Hauw D¹¹Institut des Sciences du Sport de l'Université de Lausanne, Switzerland²Laboratoire CETAPS, Université de Rouen, France**Introduction:**

Various models of carrying and hydration systems were designed to be compatible with the activity of running in natural environments. However their effects on trail runners' activity remain unclear. Research in sports sciences field emphasised the relevance of studying athletes' activity (Hauw, 2009; Adé, Poizat, Gal-Petitfaux, Toussaint and Seifert, 2009). Therefore, this study aimed at analysing how these various carrying systems impacted on trail runners' activity by using the course of action research program (Theureau, 2006). We hypothesised that when the carrying device was uncomfortable, its discomfort would be emphasised in difficult situations.

Methods:

Nine non-professional trail-runners volunteered to participate to the study. They ran five times the same three-kilometres hilly loop and changed the carrying system at the end of each loop. After the running trials, each runner did a one-hour self-confrontation interview with the researchers. They were confronted to the traces of past activity (i.e. pictures and maps of the route and pictures of them during the transitions between each trial). The confrontation to the traces aimed at collecting runners' experience at the moment when the action occurred (Theureau, 2006). The self-confrontation interviews were encoded according the course of action framework (Sève, Saury, Theureau, & Durand, 2002).

Results:

We identified four typical sequences of activity that characterized interactions with the carrying system emerging of in specific situations: (1) inquiring and exploring (i.e. adjusting the straps of the carrying device or trying to drink with the hydration system), (2) dealing with the constraints (i.e. in spite of discomfort of the carrying system, runners tried to focus on their more general running activity), (3) forgetting the carrying system (i.e. when the situation was more difficult, runners did not report any concern in relation with the carrying system) and (4) focusing again on the carrying device in easier situations.

Discussion:

These results suggested that runners enacted the carrying system in their activity depending on the situation. We expected that issues caused by an inappropriate carrying system would increase in difficult situations; however the results showed that in difficult situations, carrying system issues did not emerge significantly in runners' experience. Inversely, when the situation appeared less constraining for the runners, the carrying system issues emerged again significantly in their concerns. The limitations of this study remain in the shortness of the loop that prevented us from studying issues due to cumulated effects of carrying discomfort. Further studies should also analyse the usability and ergonomics of carrying systems in situation. However, this protocol provided practical implications for equipment designers through its original method since it analysed data extracted from the use of equipment in situation (Poizat, Haradji & Seifert, 2011).

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Injury rates in relation to training load in elite orienteering athletes

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Introduction:

To be successful as an elite athlete, frequent and intense training is necessary. Orienteering athletes perform a great part of their training as running sessions. However, a high weekly running mileage is known to stress the athlete's musculoskeletal system substantially (Nielsen, Buist, Sorensen, Lind, & Rasmussen, 2012; van Mechelen, 1992). Consequently, injuries can occur, especially overuse injuries. The aim of this study was to investigate the relation between training characteristics and injury rates in Swiss junior and elite orienteering athletes.

Methods:

Data were assessed retrospectively from currently and formerly active athletes of the Swiss Orienteering Federation national team. The athletes' medical records were used to classify injuries according to the Orchard Sports Injury Classification System (OSICS version 10.1). Training data were collected from the athletes' individual training diaries. A multiple linear backward regression analysis was performed to detect injury incidence rate risk factors. The results are presented as mean \pm standard deviation, injuries were allocated to anatomical location, acute or overuse onset.

Results:

Data of 42 athletes (24 male, 18 female) were available for the observed age range 14 – 30 years. The mean training duration was 461.0 ± 114.6 minutes per week distributed on 7.5 ± 2.1 training sessions. High-intensity interval training was performed in 11.6% of all running sessions. Overall, 288 injuries were assessed, thereof, 63.5% were classified as overuse injuries. The most commonly affected anatomical locations were knee (26.4%), lower leg (22.2%), and ankle (18.8%). The mean injury incidence rate was 1.2 ± 0.8 injuries per 1000 hours of training with a peak of 2.6 ± 3.6 injuries per 1000 hours of training at 19 years of age. Four variables explained 14.7% of variance of injury incidence rate. Previous injury, low volume of endurance running, high volume of regeneration training, and a low proportion of high-intensity interval training were positively related to high injury incidence rates.

Discussion:

The observed injury incidence rate in orienteering athletes was lower compared to the previously reported 2.5 – 5.8 injuries per 1000 hours of training in elite endurance runners and orienteering athletes (Johansson, 1986; van Mechelen, 1992). However, the most commonly injured locations were the same. Previous injury is a well-known risk factor; a more recent finding is that a higher proportion of high-intensity interval training might decrease the injury risk (Hespanhol Junior, Pena Costa, & Lopes, 2013). Regression analysis further showed that injuries might cause shorter endurance runs and more regeneration training. Swiss orienteering athletes are internationally top ranked and comparatively rarely injured; this supports the assumption of well-planned and well-executed training sessions. However, the percentage of high-intensity interval training within endurance running might be increased to further prevent running-related injuries.

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ZumBeat: Evaluation of a Zumba dance intervention in postmenopausal overweight women**Authors:** Rossmeißl A¹, Lenk S¹, Hanssen H¹, Donath L², Schmidt-Trucksäss A¹, Schäfer J¹¹Bereich Sport- und Bewegungsmedizin, Departement für Sport, Bewegung und Gesundheit, Universität Basel, Schweiz²Bereich Trainingswissenschaft, Departement für Sport, Bewegung und Gesundheit, Universität Basel, Schweiz**Introduction:**

Insufficient physical activity is a major health hazard constituting a public health concern. A decline in physical activity around the age of 55 is observed in women (Sun, Norman & While, 2013). Overweight and inactivity increase the cardiovascular risk in postmenopausal women substantially, besides the risk associated with the shifting levels of hormones. Literature suggests that Zumba dance is a suitable training method to enhance cardiovascular fitness and strength, but older overweight women have rarely been studied. The aim of this study was to assess the feasibility and effect of a 12-week ZumBeat dance intervention on cardiorespiratory fitness and psychosocial health.

Methods:

Postmenopausal women with a body mass index (BMI) >30 kg/m² or waist circumference >94 cm who were not regularly physically active were asked to complete a 12-week ZumBeat dance intervention with instructed and home-based self-training sessions 3 times per week. Before and after the intervention, peak oxygen consumption (VO₂peak) was assessed on a treadmill; body composition and several psychometric parameters (including quality of life, sports related barriers and menopausal symptoms as well as eating behavior) were investigated. Heart rate was monitored during 3 training sessions in week 1, 5 and 12.

Results:

Of 17 women (median age: 54 years, median BMI: 30 kg/m²) enrolled in the study, 14 completed the study. The overall median training attendance was 85% of the recommended 36 training sessions. Participants performed the instructed training sessions in week 1, 5 and 12 at a median of 69%, 75% and 72% of the maximum heart rate. There was no apparent change in VO₂peak after the 12-week intervention period (average change score: -0.5 ml/kg/min). However, participants showed improvements in psychometric parameters: quality of life was increased by an average of 9.2 out of 100 points. Menopausal symptoms decreased by 2.4 out of 44 points, sports related barriers decreased by 0.4 out of 4 points and feelings of hunger decreased by 2.2 out of 14 points.

Discussion:

Our results suggest no benefit for cardiorespiratory fitness following a 12-week ZumBeat dance intervention. One previous study showed an improvement of 1 ml/kg/min in VO₂peak after a similar 16-week 3 times weekly intervention (Krishnan, Krstrup, Jackman, Brekke & Holtermann, 2014), another study showed an improvement of 1.46 ml/kg/min in slightly younger and lighter women (Krishnan et al, 2015). However, the training heart rates achieved in our study were sufficient to stimulate gains in endurance and fitness and overall training attendance was high. It may be the great variability in training attendance with a lack of continuity over the summer period that could explain the lack of measurable gains in VO₂peak. Given the observed improvements in psychometric parameters and menopausal symptoms combined with the good feasibility in terms of adherence, longer intervention periods focusing on long-term health gains should be undertaken.

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Strength and balance development during one competitive season in high level female football players**Authors:** Roth R¹, Betschart A¹, Donath L¹, Zahner L¹, Faude O¹¹Department of Sport, Exercise and Health, University of Basel, Switzerland**Introduction:**

With regard to injury prevention isokinetic assessment of leg flexors and extensors is frequently used to identify imbalances between antagonist muscles and between left and right leg. Similarly, a balanced strength of trunk muscles, i.e. during flexion, extension and rotation, as well as a well-developed dynamic balance ability is considered beneficial from a performance and injury prevention perspective. In female football, data focusing on leg and trunk strength asymmetries and balance performance is scarce to date. Information about the physical development from youth to adult female players may help to understand the time course of strength and balance development. Additionally, such information is important to estimate an appropriate test frequency during the talent development in female youth players.

Methods:

For the cross-sectional part of the study, 45 female soccer players of a high-level Swiss football club (U16: N=19; age = 15.0 (SD 0.7) years; body mass = 54.6 (5.8) kg; body fat = 20.3 (6.8)%; U18: N=15; age = 16.8 (0.6) y; body mass = 59.9 (8.0) kg; body fat = 18.4 (8.8)%; adult players: N=11; age = 21.2 (2.4) y; body mass = 61.1 (6.1) kg; body fat = 16.0 (7.8)%) agreed to take part. For the longitudinal study, 26 players remained (u16: N=10; u18: N=10; adult players: N=6) which were tested twice during the pre-season conditioning period as well as during the second leg of the competitive season. Strength of hamstrings (H) and quadriceps (Q) were measured on an isokinetic device (IsoMed 2000) at a speed of 60°/sec, 240°/sec (concentric) and -30°/sec (eccentric). H:Q-ratio was calculated for both right and left side at 60°, 240° and -30°/240° [1]. Strength ratios between flexion/extension and left/right rotation were calculated for each group, respectively. Dynamic balance performance was assessed by means of the y-balance composite score, particularly with respect to differences preferred and non-preferred kicking leg.

Results:

Physical development in female soccer players from the under-16 to the adult team is mainly displayed by an increase in weight (u16: 54.6 (5.8); u18: 59.9 (8.0); A: 61.1 (6.1)), while percent body fat decreased (u16: 20.3 (6.8); u18: 18.4 (8.8), A: 16.0 (7.8)). At all speeds leg strength in the preferred kicking leg is higher in all age-categories for extension (i.e. 60°, u16: +4%; u18: +7%; adults: +13%) as well as flexion (60°, u16: +10%; u18: +9%; adults: +18%). Strength ratio for leg flexion/extension (Croisier et al., 2003) showed also a higher ratio in the preferred kicking leg. Trunk strength values also rose with age, and ratios between isometric trunk flexion and extension developed continuously (u16: 1.59; u18: 1.68; adults: 1.86). Regarding balance performance, the composite score showed no differences between groups and legs ($p=0.75$). The second measurement at the end of the season showed only differences in the u16 players: Weight ($p=0.005$) and BMI ($p=0.003$) increased, only peak torque for knee extension (60°/sec) also increased significantly (preferred leg: +15%; non preferred leg: +13%).

Discussion:

Our results show that an unequal development in physical strength over age categories can occur in high-level female soccer players. However, players showed only small differences between preseason and the second half of the season. H:Q ratios as well as the composite score showed different development in preferred and non-preferred kicking leg. Whether strength and balance imbalances are potentially harmful cannot be finally clarified, but to prevent injuries and detect aberration, players should be assessed at least once a season.

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Comparison of sleep disorders between real and simulated high altitude**Authors:** Saugy JJ^{1,2}, Heinzer R³, Rupp T⁴, Faiss R^{1,2}, Bourdillon N^{1,2}, Millet GP^{1,2}¹ISSUL, Institute of Sport Sciences, Faculty of Biology and Medicine, University of Lausanne, Switzerland²Department of Physiology, Faculty of Biology and Medicine, University of Lausanne, Switzerland³Center for Investigation and Research in Sleep, CHUV, Lausanne, Switzerland⁴Savoie Mont Blanc University, Exercise Physiology Laboratory, Chambéry, France**Introduction:**

There is currently a large debate about the pathophysiological responses to two different types of hypoxic exposure: normobaric hypoxia (NH) and hypobaric hypoxia (HH) (Millet, Faiss, & Pialoux, 2012). Moreover, altitude also seems to have an impact on respiratory physiology in both HH and NH during sleep. In addition, Nespoulet et al. showed that O₂ and CO₂ chemosensitivity are closely related to ventilation during NH (Nespoulet et al., 2012). The purpose of the present study was therefore to investigate how far sleep and breathing disturbances may be different between these two hypoxic conditions in order to better understand the underlying pathophysiological mechanisms.

Methods:

Thirteen healthy trained males subjects volunteered for this study (mean ± SD; age 34 ± 9 yrs, body weight 76.2 ± 6.8 kg, height 179.7 ± 4.2 cm). They were exposed to 26 h of simulated (NH, F_IO₂ 13.6%, PB 715.8 ± 3.8 mmHg, P_IO₂ 91.0 ± 0.6 mmHg, corresponding to 3450 m) or real altitude (HH, F_IO₂ 20.9%, PB 481.8 ± 4.7 mmHg, P_IO₂ 90.9 ± 1.0 mmHg, 3450 m) and a control condition (NN, F_IO₂ 20.9%, PB 718.1 ± 3.3 mmHg, P_IO₂ 140.5 ± 0.6 mmHg, 485 m) in a randomized order. The sleep assessments were performed with nocturnal polysomnography (PSG) and subjective feeling questionnaires.

Results:

Mean pulse oxygen saturation was further decreased during the night in HH than in NH (81.2 ± 3.1 vs. 83.6 ± 1.9%; p<0.01) when compared to NN (95.5 ± 0.9%; p<0.001). Heart rate was higher in HH than in NH (61 ± 10 vs. 55 ± 6 bpm; p<0.05) and NN (48 ± 5 bpm; p<0.001). Total sleep time was longer in HH than in NH (351 ± 63 vs. 317 ± 65 min, p<0.05), and both were shorter compared to NN (388 ± 50 min, p<0.05). Breathing frequency did not differ between the 3 conditions. The apnea-hypopnea index was higher in HH than in NH (35.9 ± 40.3 vs. 37.8 ± 34.9; p<0.05) and NN (7.1 ± 4.5; p<0.001). Subjective sleep quality was similar between NH and HH but lower than in NN.

Discussion:

To our knowledge, this is the first study comparing directly the effects of normobaric vs. hypobaric hypoxia with matched inspired pressure of oxygen on sleep structure and sleep disordered breathing in the same group of subjects. The major finding is that the addition of hypobaria to hypoxia (i.e. HH) further alters nocturnal breathing and sleep quality compared to hypoxia alone (i.e. NH). Our results demonstrate that hypobaric hypoxia (e.g. “real altitude”) has a greater impact on nocturnal breathing and sleep structure than normobaric hypoxia (e.g. “simulated altitude”) conditions. The main differences between these conditions could be NO metabolism altering pulmonary capillaries vasodilation or an increased physiological dead space due to hypobaria, but these hypotheses will need to be confirmed in further studies. Further researches are required to determine individually the duration and severity of inspired PO₂ for achieving an optimal combination of positive (erythropoietic and peripheral) effects without significantly counteracting/inducing maladaptive consequences to recovery and performance.

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Interest of abductors/adductors isokinetic strength testing in elite hockey players**Authors:** Schaffner K¹, Besson C², Gremion G², Degache F^{1,3}¹Institute of Sport Sciences of the University of Lausanne, University of Lausanne, Switzerland²Swiss Olympic Medical Center, Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland³University of Health Sciences, University of Applied Sciences and Arts Western Switzerland, Lausanne, Switzerland**Introduction:**

Isokinetic muscle strength is commonly associated as strong performance predictor factor in different sports. Mascaro et al. investigated the relationship between quadriceps and hamstrings isokinetic strength and a skating performance in hockey players (Mascaro, Seaver, & Swanson, 1992). Second, Nightingale's literature review (Nightingale, Miller, & Turner, 2013) describes the vertical jump and the sprint as skating performance predictors. The first goal of this study is to analyze the relationship between isokinetic strength of hip adductors and abductors and on-ice sprints performance (time and maximum skating speed) in elite hockey players. The second goal is to compare off-ice and on-ice tests.

Methods:

Eleven hockey players did three sprints of 36.5 meters (with a time at 6.1 meters) on-ice and off-ice and three vertical jumps. Seven days after these tests, an isokinetic test of hip abductors/adductors muscle strength following a specific protocol was performed (concentric and eccentric 30°.s⁻¹ and concentric 120°.s⁻¹).

Results:

We found significant correlations between concentric isokinetic muscle strength of right adductors at 120°.s⁻¹ and skating time at 36.5 meters (ICC: -0.788; p = 0.01). We also found significant correlations between skating time at 6.1 meters and the strength of right abductors in concentric at 120°/s (ICC: -0.836; p = 0.005) and between the maximum skating speed and the maximum strength of right adductors in concentric at 120°/s (ICC: 0.743; p = 0.02). There are also relationships between off-ice and on-ice sprints (CC: 0.778; p = 0.0048). We found relationships between the vertical jump and the on-ice sprint (CC: -0.603; p = 0.0495).

Discussion:

These results tend to validate our initial hypothesis that stated that there is a relationship between adductors hip strength and on-ice skating performance. These observations joined the results of Mascaro (Mascaro et al., 1992) which showed a relationship between skating performance and quadriceps muscle strength in elite hockey players. The second hypothesis is also validated. First, the vertical jump height is correlated with an on-ice skating performance and meets several studies like Janot (Janot, Beltz, & Dalleck, 2015). Second, off-ice sprints are also correlated with on-ice sprint and joined several studies (Bracko & George, 2001; Janot et al., 2015).

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Loading conditions and movement pattern during back-extension exercises**Authors:** Schellenberg F¹, Häberle R¹, Schmid N¹, Lorenzetti S¹¹Institute for Biomechanics, ETH Zürich, Switzerland**Introduction:**

The “back-extension” exercise is a strength exercise for the lower back and dorsal hip muscles and therefore often used in training and rehabilitation programs (Da Silva, Lariviere, Arsenault, Nadeau, & Plamondon, 2009). In order to avoid overloading and to derive training recommendations for athletes and patients, knowledge of the exercise specific ranges of motion and the resulting external joint moments is fundamental. Therefore, the aim of this study was to understand the biomechanical differences in the hip and back between different execution forms of the “back-extension” exercise.

Methods:

Kinetics and kinematics of two different execution forms (DH; dynamic hip and DS; dynamic spine) of the strength exercise “back-extension” were measured and analysed in 8 male, 8 female subjects (26±4 y, 72±15 kg, 176±9 cm). DH was executed with a motion in the hip and an isometrically stabilized spine while DS was performed static in the hip and dynamic in the spine. Each of the two execution forms was performed in three different ways (both legs and one leg fixed at the bench as well as with an inversed breathing pattern) and with 8 repetitions each. Motion was captured using 21 optoelectronic motion system cameras (Vicon, Oxford Metrics Group, UK) operating at 100 HZ while the IfB Marker Set (77 skin marker; List, Gülay, Stoop, & Lorenzetti, 2013) was attached to the subjects. To assess the kinetics, a special bench was fixed onto two force plates (Kistler, Winterthur, Switzerland), each capturing with a frequency of 2 kHz to measure ground reaction force. External joint moments were calculated by means of an inverse approach with a quasi-static solution. The moments were normalized with bodyweight (BW). Kinematically, the range of motions (RoMs) of knee, hip and spine and kinetically, the external joint moments in the knee, hip and back at level L4/L5 were statistically analysed using a Bonferroni corrected linear mixed model with subjects as random effects.

Results:

Comparing the two-legged forms, the observed RoM as well as the external maximal moment in the hip was larger during DH (36.3±7.9°, 0.84±0.11 Nm/BW) than during DS (15.5 ± 11.7°, 0.67 ± 0.13 Nm/BW), while in the back a higher maximal moment (1.05 ± 0.20 Nm/BW) was observed with similar RoMs in the lumbar curvature (5.2 ± 2.0 m⁻¹) during DH compared to DS (0.96 ± 0.22 Nm/BW, 5.4 ± 2.1 m⁻¹). The inverted breathing pattern did not influence loading conditions. Performing single-legged “back-extensions” led to higher moments in the hip (DH: 1.14 ± 0.18 Nm/BW, DS: 0.92 ± 0.25 Nm/BW) with a smaller RoM in the hip (DH: 29.6 ± 7.4°, DS: 14.1 ± 9.9°) compared to the two-legged form. However, loading patterns in the spine were not influenced by this form.

Discussion:

In order to strengthen hip and lower back, the DH seems to be more efficient due to higher moments with higher or similar RoM in hip and lower back, respectively. On the other hand, performing single-legged “back-extensions” should preferably be chosen to strengthen the hip. Compared to squats and deadlifts with an extra load of 25% BW on a barbell (Schellenberg, Lindorfer, List, Taylor, & Lorenzetti, 2013), a similar external hip moment was observed during DH single-legged “back-extensions” while half the loading acts on the back during DH.

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Die Effekte unterschiedlicher Bewegungspausen auf die Aufmerksamkeit von Primarschulkindern – Zur Bedeutung des Affekts**Autor/innen:** Schmidt M¹, Kamer M¹, Conzelmann A¹¹Institut für Sportwissenschaft, Universität Bern, Schweiz**Einleitung:**

Obwohl von Vertretern der „Bewegten Schule“ seit den 90er-Jahren positive Effekte von Bewegungspausen auf die Konzentrationsleistung diskutiert werden, mangelt es bisher an empirischer Evidenz. Die Ergebnisse der wenigen Studien, welche zum Thema durchgeführt wurden, deuten allerdings darauf hin, dass sich 10 bis 20-minütige Bewegungspausen kurzfristig positiv auf die Konzentrationsleistung von Primarschulkindern auswirken (Janssen, Toussaint, van Mechelen, & Verhagen, 2014). Die Frage, durch welche inhaltliche und methodisch-didaktische Ausgestaltung sich Bewegungspausen auszeichnen sollten, um möglichst effektiv zu sein, ist jedoch nach wie vor unbeantwortet. Im folgenden Beitrag wird daher neben den Effekten von kognitiv und physisch unterschiedlich beanspruchenden Bewegungspausen auch der von Audiffren und André (2015) postulierten kognitionsfördernden Wirkung des positiven Affekts nachgegangen.

Methode:

Im Rahmen einer randomisierten Kontrollgruppenstudie wurden insgesamt 97 Schülerinnen und Schüler von 5 fünften Klassen ($M_{\text{Alter}}=11.74\pm.50$ Jahre; 46.4% Mädchen) untersucht, die einer der vier experimentellen Bedingungen (2x2 between-subject Design) zugeteilt wurden. Durch die Konzeption dieser vier Experimentalbedingungen wurde sichergestellt, dass alle vier möglichen Kombinationen aus hoher resp. niedriger kognitiver und körperlicher Beanspruchung im Design repräsentiert waren. Vor und nach jeder Bedingung wurde mit dem Test d2-R (Brickenkamp, Schmidt-Atzert, & Liepmann, 2010) die Konzentrations- und Konzentrationsleistung erhoben. Zur Erhebung des affektiven Zustandes wurde zudem die Kurzversion der PANAS eingesetzt (Ebesutani et al., 2012).

Resultate:

Varianzanalytische Auswertungen zeigen nur unter Hinzunahme der Veränderungswerte des positiven Affekts als Kovariate einen signifikanten Haupteffekt der kognitiven Beanspruchung ($F(1, 92) = 6.67, p = .01, \eta^2 = .07$). Der Haupteffekt der physischen Beanspruchung ($F(1, 92) = .22, p = .64, \eta^2 = .00$), sowie die Interaktion der beiden Faktoren fallen nicht signifikant aus ($F(1, 92) = 1.30, p = .26, \eta^2 = .01$). Das Gesamtmodell bleibt ohne Berücksichtigung der Affekt-Werte nicht signifikant ($F(3, 93) = 1.83, p = .15, \eta^2 = .06$), wobei sich die Effektgrösse bei Aufnahme des Affekts mehr als verdoppelt ($F(4, 92) = 3.53, p = .01, \eta^2 = .13$).

Diskussion:

Die Ergebnisse verweisen auf die Wichtigkeit, bei Studien zum Zusammenhang von Sport und Kognition weitere psychologische Variablen zu erheben, um den zugrundeliegenden Wirkmechanismen auf die Spur zu kommen. Diese Resultate werden vor dem Hintergrund weiterer Studien zum Einfluss des Affekts auf die kognitive Leistung von Kindern und Jugendlichen diskutiert.

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Decision-making in football officiating: An interview study with top-level referees**Authors:** Schnyder U¹, Hossner E-J¹¹Institute of Sport Science, University of Bern, Switzerland**Introduction:**

Officials take a vital role in almost every competition-oriented game sport. For this reason, an interesting area of research has emerged over recent years with respect to sport officiating (MacMahon et al., 2014). However, the majority of the football-related studies can be characterised as pursuing a “from-theory-to-practice” strategy. Hence, the identification of potential problems is rooted in scientific theories in the first instance before it is empirically checked whether these problems can be proven relevance also under the applied conditions of the practical situation. Therefore, the present project aimed on the reconstruction of subjective theories of elite football referees and on the identification of problems in the practice of top-level football officiating.

Methods:

Semi-structured interviews were conducted to collect data from 23 European elite referees, either from UEFA’s elite group (19) or first group (4). Thus, the interviewees can be considered to represent the best referees in Europe. With the average length of 19.4 min ($SD = 5.4$ min, range: 10.5 min-39.2 min), all interviews were transcribed verbatim, analysed independently by two coders and further processed on the basis of inductive content analysis (Mayring, 2008).

Results:

From the entire interview material, the data analysis resulted in 91 raw-data themes that were grouped into 22 lower-order themes and further structured into 7 higher-order themes, namely: (1) *descriptive* (reason to become a referee), (2) *characteristics of a good elite referee* (educability, game management qualities, mental attributes, fitness, personal characteristics, football intelligence, and experience), (3) *difficulties* (human limitations, development of football, pressure, amateur status, cheating of players, and personal state of mind), (4) *pre-match preparation* (understanding the teams, and referees’ team), (5) *communication through headset* (importance, way of communication, and training), (6) *decision-making* (teamwork, gaze behaviour, the relative location of the referee, experience, and reactions of players), and (7) *decision-making training* (training within game set-ups, video-based training, desirable tools, mental practice, and visual training).

Discussion:

The comparison of the subjective relevant issues with the findings revealed by scientific research on football officiating shows that the vast researched area of visual capabilities and perception enhancement is also recognised by the interviewees as highly relevant. In contrast, a number of scientific publications can be found on effects of potential biases on decision-making whereas biases were not mentioned by the referees as an important issue affecting their decision-making. A clear need for further research, however, could be revealed for those topics which, according to the statements of the interviewees, are on the one hand highly relevant from a practical perspective but for which, on the other hand, only a small amount or even no scientific investigations can be found so far. These topics refer to the optimisation of the pre-match preparation, the evaluation of supporting technical devices, the development of innovative training tools for improving decision-making quality, the optimisation of the communication within the referee team, particularly through the headset, and the evaluation of supporting training methods like mental practice. Hence, for sport scientists with a special interest in applied work, these topics can be recommended for conducting further research.

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The “splendid isolation”: How Swiss sports journalists deal with their professional reputation**Authors:** Schoch L¹¹Institut des Sciences du Sport de l'Université de Lausanne (ISSUL), Université de Lausanne, Suisse**Introduction:**

Sports journalism is an important part of the news media. Several research have shown that sports journalism has been crucial to the economic success of news organisations for a long period of time because it draws readers and delivers a large and loyal readership to advertisers (Brookes, 2002). However, sports journalism is often dismissed as the “toy box” of the newsrooms and is generally not seen as prestigious within the culture of news and journalism (Rowe, 2007). The aim of this study was to analyse the situation in the Swiss French daily press. We wanted to investigate sports journalists' opinion on their professional status within the profession and question the way they deal with it. Do sports journalists have the feeling that sports desks are ghettoized within the newsrooms and what do they do about it? Do they struggle to enhance their occupational prestige? If yes, how, and if not, why? Here are the particular questions that we wanted to analyse.

Methods:

In order to do so, we have conducted participant observation in two Swiss dailies and 25 semi-structured interviews with sports journalists (12 women, 13 male).

Results and Discussion:

Sports journalism occupies a paradoxical position within the Swiss French-speaking daily press. On the one hand, the delicate economic situation of the Swiss press encourages Editors-in-chief to strengthen the position of the sport and make a greater use of its entertainment dimension. Thus, sport is more than ever a key feature for Swiss newspapers. Nonetheless, on the other hand, sport remains a “toy department” and suffers from a lack of recognition within the journalistic field. Sports journalists are under a stereotype threat and suffer from a weak legitimacy within the profession. Journalists criticize this low position with respect to professional reputation, but our study shows surprisingly that they do not really seek more recognition and do no fight to be considered as “journalists like others”. In fact, they seem to consider that this position gives them great autonomy within newsrooms and allows them to be driven by their own values and goals. Sports journalists appreciate that above all, even if it contributes to their stigmatization. Thus, they try to preserve it, especially as their superiors currently tend to interfere more in their work. Finally, it appears that while their low professional prestige could create a certain “precarity” and negative work experiences (Paugam, 1995), sports journalists develop a rhetoric of autonomy which helps them to present themselves positively and also to convince themselves that sports journalism offers a great and unique context of work.

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Decline of hand-grip strength endurance in different arm positions does not differ between recreational and ambitious climbers**Authors:** Schönbächler G¹, Faude O¹, Zahner L¹, Donath L¹¹Department of Sport, Exercise and Health, University of Basel, Switzerland**Introduction:**

Within the last two decades, recreational, ambitious and elite sport climbing grew to a higher degree of popularity. There is, however, still a need of specific performance analyses that enable training and performance testing and monitoring. The strength decrement index (SDI) (Jones, Robertson & Figoni, 2009) might serve as an appropriate measure to indicate climbing-specific strength endurance. The present study investigated the time course of maximal isometric grip strength and the SDI, depending on testing position, laterality and climbing level. We intended to provide a feasible maximal strength-endurance parameter.

Methods:

Seventeen recreational (climbing level (CL): 6.8 ± 0.5 UIAA metric scale) and eleven ambitious (CL: 8.7 ± 0.6 UIAA metric scale) climbers were included into the study (age: 27 ± 8 y; BMI: 21.6 ± 1.9 kg/m²; ape index: 1.05 ± 0.18 ; training volume: 2.2 ± 1.0 hours per week). All participants completed repetitive maximal isometric handgrip strength tests in four positions: left and right hand beside the trunk as well as left and right hand above the shoulder. Each position was tested for twelve repetitive work-relief cycles lasting 4 and 1 second(s) (Donath, Rösner, Schöffl, & Gabriel, 2011). Besides strength measures, also heart rate and perceived exertion levels were recorded. A five minute break between each testing was provided. Differences between the left and right side of the upper and lower hold positions were calculated for maximal grip strength, strength decrement index (SDI), heart rate and rating of perceived exertion (RPE).

Results:

Maximal grip strength differed between both groups in all positions ($p < 0.05$). A significant side effect with higher strength values on the right side was found for lower and upper grip positions ($p < 0.05$). A side x position x time x group interaction was found for the time series data of isometric grip strength ($p = 0.009$, $\eta^2 = 0.71$). However, post hoc tests did not reveal significant differences between both groups during the testing conditions. Independent of climbing level, the percentage SDI revealed a side effect with a lower strength decline on the right side for the upper grip positions ($p = 0.01$, $\eta^2 = 0.22$). The lower grip position did not reveal a side effect ($p = 0.60$, $\eta^2 = 0.01$). A group difference for heart rates was merely found for the bottom right position. The subjective perceived exertion levels showed no significant side x position x group interaction after the 12 consecutive trials ($p = 0.53$, $\eta^2 = 0.015$).

Discussion:

Grip strength decline did not relevantly differ between both ambitious and recreational climbers. The decline of strength is lower on the dominant (right) side. Compared to the recreational climbers, ambitious climbers showed, however, higher maximal grip strength. The time course of hand grip strength seems to mainly depend on maximal grip strength values. Overall, the percentage decrease of maximal grip strength does not seem to serve as an adequate measure of climbing specific strength-endurance capacity.

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Evaluation of an inventory for the assessment of critical incidents involving football fans

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Introduction:

Fan violence is a frequent occurrence in Swiss football (Bundesamt für Polizei, 2015) leading to high costs for prevention and control (Mensch & Maurer, 2014). Various theories put forward an explanation of fan violence, such as the Elaborated Social Identity Model (Drury & Reicher, 2000) and the Aggravation Mitigation Model (Hylander & Guvå, 2010). Important observations from these theories are the multi-dimensional understanding of fan violence and the dynamics occurring in the fan group. Nevertheless, none of them deal with critical incidents (CIs) which involve a tense atmosphere combined with a higher risk of fan violence. Schumacher Dimech, Brechbühl and Seiler (2015) tackled this gap in research and explored CIs where 43 defining criteria were identified and compiled in an integrated model of CIs. The defining criteria were categorised in four higher-order themes “antecedents” (e.g. a documented history of fan rivalry), “triggers” (e.g. the arrest of a fan), “reactions” (e.g. fans masking themselves) and “consequences” (e.g. fans avoiding communication with fan social workers).

Methods:

An inventory based on this model is being developed including these 43 criteria. In an exploratory phase, this inventory was presented as an online questionnaire and was completed by 143 individuals. Three main questions are examined: Firstly, the individual items are tested using descriptive analyses. An item analysis is conducted to test reliability, item difficulty and discriminatory power. Secondly, the model’s four higher-order themes are tested using exploratory factor analysis (EFA). Thirdly, differences between sub-groups are explored, such as gender and age-related differences.

Results:

Respondents rated the items’ importance as high and the quota of incomplete responses was not systematic. Two items were removed from the inventory because of low mean or a high rate of “don’t know”-responses. EFA produced a six-factor solution grouping items into match-related factors, repressive measures, fans’ delinquent behaviour, intra-group behaviour, communication and control and inter-group factors. The item “fans consume alcohol” could not be ordered into any category but was retained since literature accentuates this factor’s influence on fan violence. Analyses examining possible differences between groups are underway.

Discussion:

Results exploring the adequacy of this inventory assessing defining criteria of CIs in football are promising and thus further evaluative investigation is recommended. This inventory can be used in two ways: as a standardised instrument of assessment for experts evaluating specific CIs and as an instrument for exploring differences in perception and assessment of a CI e.g. gender and age differences, differences between interest groups and stakeholders.

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The influence on learning outcomes in Physical Education (PE)

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Introduction:

What works in PE? Educational research in PE deals with questions like: What kind of minimum knowledge, abilities and attitudes all pupils should have acquired by the end of initial education? The fundamental aim of PE should be to provoke individual capacity to become physically active. Therefore, the outcome of PE includes motor competencies, as well as motivational-volitional, social, and cognitive constructs. Currently, the MOBAQ-approach (Kurz, Fritz & Tscherpel, 2007) is the only available reliable test to assess physical output in PE. Next to it there are two particular aspects on the motivational-volitional side. Having general interest in PE is a condition for transforming learning results into the daily life of children. Further, the willingness to work should be promoted and encouraged within PE for promoting active lifestyles. It is of utmost importance to examine the influential factors of these output indicators. Therefore, the processes and benefits of PE-instruction need to be analysed with regard to their relevance to the output factors. The quality of instruction can be subdivided into the latent segments of “classroom management” and “student orientation” (Klieme & Rakoczy, 2008). The research question, “which determinants of QPE have an impact on learning results of students in PE?” will be answered in detail questions includes demands about the impact of classroom management and student orientation on (a) MOBAK, on the (b) interest in PE and on the (c) willingness to work of students.

Methods:

Data has been collected in the IMPEQT study (funded by the EDK from 09.2011 – 03.2014; directed by E. Gerlach). Overall, there were 1081 7th grade students participating (49.1% female, age M = 13.2, SD = .63) at two data collection dates (01.-03.2012 and 2013). Measurements took place in Basel-Land, Aargau and Zürich. The original MOBAQ tasks were adapted and modified for 7th graders. It includes twelve tasks, which could be separated in two latent MOBAK constructs (“locomotion” and “object control”) after assessing an EFA and a CFA using IRT models in MPLUS. Additionally, each student completed a questionnaire about social demographics, sport engagement, learning and achievement dispositions. All data was prepared in SPSS and multilevel analyses were deducted in HLM.

Results:

Descriptive analyses reveal that about 20% of the students show deficiencies in the MOBAK. Between the two data collections, boys showed a significant improvement in both competence fields, whereby girls decreased in the locomotion tasks (Interaction time x sex $F = 36.40$; $p = .000$; $\eta^2 = .040$). Regarding both measurement dates and both latent MOBAK constructs the calculated intra-class correlation showed evidence (ICC .180 - .239). This means that variance can be attributed to the assignment to a certain class. Due to the fact that the MOBAK remained quite constant over the period of one school year, there is hardly variance for change and growth. In contrast affective output variables are less stable. Respectively, the quality aspects show many significant influences on motivational aspects.

Discussion:

This study provides first indicators of determinations of motor competencies and motivational aspects of PE. At this point there is need for further discussions and a mutual consent of the requirements of the output of PE. In detail, the study suggests that the quality of teaching places a central role in PE. Accordingly, the quality of PE should get particular significant. Especially the part of the “student orientation” should be analysed at length and conjunction with the output factors.

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Macht oder Ohnmacht der Lehrpersonen? Subjektive Reinterpretation der Bedingungsfaktoren schulischer Lernleistungen im Sportunterricht**Autor/innen:** Seiler S^{1, 2, 3}, Herrmann C¹¹Departement für Sport, Bewegung und Gesundheit, Universität Basel, Schweiz²Pädagogisch Hochschule, Fachhochschule Nordwestschweiz, Schweiz³Strukturbereich Bildungswissenschaften, Universität Potsdam, Deutschland**Einleitung:**

Im Angebot-Nutzen-Modell (Helmke, 2010) werden Bedingungsfaktoren genannt, die Einfluss auf Schülerlernleistungen nehmen. Um die Qualität von Unterricht zu steigern und damit auch die Leistung des Lernprozesses zu optimieren, ist es von hohem Interesse diese Bedingungsfaktoren nicht nur zu kennen, sondern diese, durch die am Lernprozess beteiligten Lehrpersonen, subjektiv deuten zu lassen. Anhand der Subjektiven Theorien (Scheele & Groeben, 1984) von Lehrpersonen wird untersucht, welche Bedingungsfaktoren für die Lernergebnisse von Schüler/innen besonders bedeutsam sind. Die Fragestellung lautet, wie Lehrpersonen Bedingungsfaktoren auf schulische Lernleistungen subjektiv konstruieren und welche Position sie sich als Lehrperson dabei zuteilen. Weiter interessiert, wie die persönliche und berufliche Situation der Lehrpersonen vor dem Kontext ihrer subjektiven Theorien einzuordnen ist.

Methode:

Im Rahmen der von der ESK geförderten Basler IMPEQT-Studie (Studienlaufzeit: 09.2011 - 04.2014; Projektleitung: Erin Gerlach) wurde hierfür die Struktur-Legetechnik (Scheele & Groeben, 1984) angewendet. Aus der Gesamtstichprobe wurde eine Teilstichprobe von Lehrpersonen gezogen, deren Klasse in den Erhebungen der Hauptstudie vergleichsweise schwache motorische Leistungen zeigten. Diese Lehrpersonen (N = 12; 75% männlich) legten vorgegebene Begriffe der Bedingungsfaktoren, die sich im Angebot-Nutzen-Modell finden in eine gewichtete Reihenfolge. Dabei begründeten sie gleichzeitig den Stellenwert einzelner Faktoren. Das Bildmaterial der subjektiven Modelle wurde zunächst deskriptiv ausgewertet und die Deutungen in vergleichbare Typen zusammengefasst. Anschliessend wurden die Erläuterungen der einzelnen Lehrpersonen inhaltsanalytisch ausgewertet und in Beziehung zu dem vorhandenen Bildmaterial gesetzt. Die Lehrpersonen füllten am nachfolgenden Messzeitpunkt einen Fragebogen mit Angaben zu ihrer privaten und beruflichen Situation aus. Diese Daten wurden nach Mittelwertvergleichen in Spinnennetzdiagrammen veranschaulicht, um die quantitativen mit den qualitativen Daten zu verknüpfen.

Resultate:

Die Ergebnisse lassen auf der Basis von Einzelfällen zwei Lehrertypen unterscheiden. Der eine Typ schreibt sich als Lehrperson selbst nur geringe Einflussmöglichkeiten auf die Lernleistungen ihrer Schüler/innen zu. Der andere Typ hingegen platziert sich selbst als eine einflussreiche Determinante in Bezug auf den Output der Schüler/innen. Die Lehrpersonen unterscheiden sich weiter in ihren Überzeugungen zur Berufswahl bzw. zur Wirksamkeit ihres Berufes. Weniger deutlich sind Unterschiede in der privaten Situation (Belastung und Zufriedenheit) festzustellen.

Diskussion:

Diese Ergebnisse der subjektiven Reinterpretation lassen sich im Rahmen einer Diskussion über Macht bzw. Ohnmacht der Lehrpersonen in Bezug auf Ihre Beeinflussung der Lernleistungen von Schüler/innen im Sportunterricht deuten. Darüber hinaus ist der Zusammenhang zwischen subjektiver Wahrnehmung der Beeinflussung der schulischen Lernleistung der Schüler/innen und den Ausprägungen des fachlichen Interesses am Fach, der Nützlichkeit und der sozialen Einflussnahme durch das Fach auf Seiten der Lehrpersonen weiter zu analysieren. Von besonderem Interesse ist zudem, wie Schüler/innen diese Lehrertypen in ihrem Verhalten und in der Einschätzung der Unterrichtsqualität wahrnehmen und beurteilen.

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Individual differences in the need for autonomy moderate effects of autonomy support on salivary alpha amylase**Authors:** Sieber V¹, Schüler J¹, Wegner M¹¹Institute of Sport Science, University of Bern, Switzerland**Introduction:**

Several situations in everyday life can lead to psychosocial stress, which is known to be reflected in physiological processes and can constitute a serious health risk (Dickerson & Kemeny, 2004). Previous studies have shown that autonomy supportive behavior of persons in hierarchical higher positions, such as teachers at school reduces physiological stress in students (Reeve & Tseng, 2011). Referring to the matching hypothesis (Schüler, Sheldon, Prentice, & Halusic, 2014) the present experiment tested whether an implicit autonomy disposition, which is defined as a preference for origin experiences, moderates the effect of different physical education (PE) teaching styles (controlling, autonomy supporting and neutral) on a physiological stress response (alpha-amylase) of adolescents at school.

Methods:

Sixty-nine students aged between 12 and 16 years ($M = 14.1$, $SD = 1.3$) participated in the experimental study that took place during regular school classes. In order to experimentally induce teaching styles, we used vignettes describing an autonomy supportive or unsupportive PE teacher. We tested whether an incongruence or a congruence between teaching styles and the student's implicit autonomy disposition respectively leads to an acute stress response reflected in heightened salivary alpha-amylase levels (sAA). For the control group the vignettes consisted of a description of a gym.

Results:

A hierarchical regression analysis was conducted to test whether the strength of the students' implicit autonomy disposition moderates the stress effect of the two experimental groups compared to the control group. The model including the interaction explained a significant proportion of variance in sAA, $R^2 = .71$, $F(7, 61) = 24.85$, $p < .001$.

Discussion:

Our study revealed that participants high in the implicit autonomy disposition showed lower sAA responses, when they were exposed to autonomy supportive vignettes compared to when they were exposed to a controlling teaching style or the neutral control condition. An inverted interaction pattern was found for people with a low implicit autonomy disposition. The results illustrate that different teaching styles concerning autonomy lead to different physiological stress responses depending on individual differences in the preference for autonomy experiences. Summing up, our study provides first evidence, that persons' physiological stress responses to autonomy supportive teaching styles differ depending on the strength of their implicit autonomy disposition. In the school context, a teacher therefore should be aware of such individual differences. Our results propose individual-based coaching or leadership styles.

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Perspektiven der Talentforschung im Fussball: Fundierung eines Subsystems „Motorik“**Autor/innen:** Sieghartsleitner R¹, Zuber C¹, Zibung M¹, Conzelmann A¹¹Institut für Sportwissenschaft, Universität Bern, Schweiz**Einleitung:**

In der aktuellen Forschung wird das Talent als ganzheitliches Individuum betrachtet, welches anhand interagierender Subsysteme definiert wird (Zibung & Conzelmann, 2013). Zur Bearbeitung von Fragestellungen der Talentselektion (TS) gilt es daher zunächst jene Variablen zu identifizieren, die ein solches Subsystem adäquat repräsentieren können. Nachfolgend wird versucht, dieses Problem für das System „Motorik“ in der TS im Fussball aufzugreifen und mithilfe erprobter Methoden der Testtheorie (Positionsstabilität, Kriteriums- und Konstruktvalidität) zu bearbeiten.

Methode:

252 Schweizer Juniorenspitzenfussballer (JSF; Jahrgang 1999) absolvierten zumindest an einem von drei Messzeitpunkten (MZP₁: n = 140, M_{Alter} = 12.27, SD = 0.29; MZP₂: n = 109, M_{Alter} = 13.89, SD = 0.29; MZP₃: n = 149, M_{Alter} = 15.36, SD = 0.30) eine Testbatterie aus Dribbling (DR), Torschuss (TO), Ballkontrolle (BK), Jonglieren (JO), Sprint (SP), Gewandtheit (GW), Sprung (SG), Rumpfkraftausdauer (RK) und intermittierender Ausdauer (AD) (Bangsbo et al., 2008; Lottermann, Laudenklos & Friedrich, 2003; Vogt, 2010). Longitudinale Daten liegen für 71 (MZP₁₋₂) bzw. 41 Spieler (MZP₁₋₃) vor. Zunächst wurde die Positionsstabilität, jeweils ausgehend von MZP₁ bestimmt (Spearman's ρ). Im Anschluss wurden mittels t-Test die konkurrente (zu MZP₃; JSF vs. zu MZP₃ aufgebotene Nationalspieler; n = 16) und prognostische Validität (zu MZP₁; JSF vs. Spieler mit bis dato höchster Expertise, d. h. überdauernder Nationalteamzugehörigkeit von U15 bis U17; n = 8) ermittelt. Abschliessend wurde mithilfe explorativer (MZP₁; EFA) bzw. konfirmatorischer Faktorenanalyse (MZP₁₋₃; CFA) das Konstrukt der als relevant identifizierten Items analysiert.

Resultate:

Die Positionsstabilität zeigt sich unabhängig vom Zeitfenster für 8 aus 9 Items von $\rho = .28$ bis $.65$ und ist für SG, SP und GW am höchsten. Einzig beim TO gibt es keinen Zusammenhang zwischen den MZP. Der t-Test zu MZP₃ (konkurrente Validität) weist beim SG und DR ein Hedges' g von $< .30$ aus. JO (g = $.85$), GW ($.83$) und AD ($.69$) trennen hingegen die Nationalspieler zu MZP₃ deutlich von den anderen JSF. Der t-Test zu MZP₁ (prognostische Validität) unterscheidet die dauerhaften Nationalspieler von den übrigen JSF in den Items BK (g = $.97$), DR ($.71$), JO ($.68$) und AD ($.62$), während GW, SG und RK die geringsten Mittelwertdifferenzen aufweisen (g $\leq .30$). In der folglich mit DR, BK, JO, SP, GW und AD ausgeführten EFA musste JO aufgrund unzureichender Eignung entfernt werden (KMO-Kriterium = $.34$). Die verbleibenden Items beschreiben die „Motorik“ mit einem Modell aus den Faktoren „Kondition“ (Varianzaufklärung: 23%; SP (a = $.84$), AD ($.45$), GW ($.41$)) und „Technik“ (21%; DR (a = $.80$), GW ($.51$), BK ($.31$)), welches zu MZP₁ und MZP₂ mittels CFA bestätigt (CFI, TLI $> .99$; RMSEA, SRMR $< .05$), zu MZP₃ jedoch abgelehnt wird (TLI = $.81$; RMSEA = $.10$).

Diskussion:

Während es beim TO fehlende Positionsstabilität ist, scheiden SG und RK mangels Diskriminierungsfähigkeit als Kriterien der TS im Fussball aus. JO kann zwar Leistungsklassen ausreichend unterscheiden, grenzt sich jedoch zu stark vom Konstrukt der verbleibenden Modellvariablen ab. Ein Subsystem „Motorik“ für Fragen der TS im Fussball scheint somit durch die Items DR, BK („Technik“), SP, AD („Kondition“) und der beidseits beteiligten GW angezeigt, wobei das Zusammenspiel zwischen den Variablen eine Änderung über die Zeit aufweist.

Literatur:

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Reduced foveal vision enhances peripheral monitoring and peripheral event detection**Authors:** Spörri N^{1,2}, Vater C¹, Lorenzetti S², Hossner E-J¹¹Institute of Sport Science, University of Bern, Switzerland²Institute for Biomechanics, ETH Zurich, Switzerland**Introduction:**

Although it seems plausible that sports performance relies on high-acuity foveal vision, it could be empirically shown that myopic blur (up to +2 diopters) does *not* harm performance in sport tasks that require foveal information pick-up like golf putting (Bulson, Ciuffreda, & Hung, 2008). How myopic blur affects peripheral performance is yet unknown. Attention might be less needed for processing visual cues foveally and lead to better performance because peripheral cues are *better* processed as a function of reduced foveal vision, which will be tested in the current experiment.

Methods:

18 sport science students with self-reported myopia volunteered as participants, all of them regularly wearing contact lenses. Exclusion criteria comprised visual correction other than myopic, correction of astigmatism and use of contact lenses out of Swiss delivery area. For each of the participants, three pairs of additional contact lenses (besides their regular lenses; used in the “plano” condition) were manufactured with an individual overcorrection to a retinal defocus of +1 to +3 diopters (referred to as “+1.00 D”, “+2.00 D”, and “+3.00 D” condition, respectively). Gaze data were acquired while participants had to perform a multiple object tracking (MOT) task that required to track 4 out of 10 moving stimuli. In addition, in 66.7 % of all trials, one of the 4 targets suddenly stopped during the motion phase for a period of 0.5 s. Stimuli moved in front of a picture of a sports hall to allow for foveal processing. Due to the directional hypotheses, the level of significance for one-tailed tests on differences was set at $\alpha = .05$ and posteriori effect sizes were computed as partial eta squares (η_p^2).

Results:

Due to problems with the gaze-data collection, 3 participants had to be excluded from further analyses. The expectation of a centroid strategy was confirmed because gaze was closer to the centroid than the target (all $p < .01$). In comparison to the plano baseline, participants more often recalled all 4 targets under defocus conditions, $F(1,14) = 26.13, p < .01, \eta_p^2 = .65$. The three defocus conditions differed significantly, $F(2,28) = 2.56, p = .05, \eta_p^2 = .16$, with a higher accuracy as a function of a defocus increase and significant contrasts between conditions +1.00 D and +2.00 D ($p = .03$) and +1.00 D and +3.00 D ($p = .03$). For stop trials, significant differences could neither be found between plano baseline and defocus conditions, $F(1,14) = .19, p = .67, \eta_p^2 = .01$, nor between the three defocus conditions, $F(2,28) = 1.09, p = .18, \eta_p^2 = .07$. Participants reacted faster in “4 correct+button” trials under defocus than under plano-baseline conditions, $F(1,14) = 10.77, p < .01, \eta_p^2 = .44$. The defocus conditions differed significantly, $F(2,28) = 6.16, p < .01, \eta_p^2 = .31$, with shorter response times as a function of a defocus increase and significant contrasts between +1.00 D and +2.00 D ($p = .01$) and +1.00 D and +3.00 D ($p < .01$).

Discussion:

The results show that gaze behaviour in MOT is not affected to a relevant degree by a visual overcorrection up to +3 diopters. Hence, it can be taken for granted that peripheral event detection was investigated in the present study. This overcorrection, however, does *not* harm the capability to peripherally track objects. Moreover, if an event has to be detected peripherally, neither response accuracy nor response time is negatively affected. Findings could claim considerable relevance for all sport situations in which peripheral vision is required which now needs applied studies on this topic.

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Bulson, R. C., Ciuffreda, K. J., & Hung, G. K. (2008). The effect of retinal defocus on golf putting. *Ophthalmic and Physiological Optics*, 28, 334-344.

Limiting shoulder muscles of a still rings strength element in international level gymnasts**Authors:** Staudenmann D¹, Keller M¹, Schaerer C², Taube W¹¹Movement and Sport Science, Department of Medicine, University of Fribourg, Switzerland²Swiss Federal Institute of Sport, Magglingen, Switzerland**Introduction:**

Strength elements represent an important part of a still rings exercise for gymnasts performing at international level. Few studies have investigated the activity of shoulder muscles during strength elements in the still rings by using surface electromyography (EMG). In one study the purpose was to see how well strength exercises can replicate muscular activity observed during the performance of exercises at the still rings (Bernasconi, Tordi, Parratte, & Rouillon, 2009). It remains, however, unclear which shoulder muscles are the limiting factor when performing strength elements in the still rings. Therefore, the present study investigated muscular activity of important shoulder muscles during fatiguing support scales by means of surface EMG.

Methods:

Six healthy top-level gymnasts (21±2 yrs, 65±6 kg; 167±5 cm) of the Swiss national team participated in the experiment. Before realizing a support scale (instructed to hold as long as possible) subjects had to perform isometric MVC of each muscle, which was measured with surface EMG (cf. Staudenmann, Potvin, Kingma, Stegeman, van Dieën, 2007): Trapezius (upper=TRu, middle=TRm, lower=TRl), deltoideus (front=DEf, middle=DEm, back=DEb), infraspinatus (IS), teres major (TM), serratus anterior (SA), latissimus dorsi (LD), pectoralis major (PM), biceps brachii BB, and triceps brachii (TB). The EMG envelop was then calculated and normalized to MVC. We quantified the mean and the range (%MVC) as well as the increase (%MVC/s) during the strength element.

Results:

The support scale could be sustained between 2-12 s by the six gymnasts. The lowest overall muscle activity was found in LD, TRu, TB (12-21%MVC) and the main active muscles were PM, IS, DEf (76-89%MVC). Similarly, the range in activity was minimal for LD, TRu, TB (5-21%MVC) and maximal for IS, DEf, PM (64-82%MVC). From the main active muscles, only PM consistently increased in activity over time (9±4%MVC/s), while IS and DEf showed an overall decrease (both: -5±7%MVC/s). Because large variations of muscle activities were found for these parameters subject-specific data were analyzed.

Discussion:

The aim of this study was to determine the limiting shoulder muscles during a strength element (support scale) in the still rings. Overall limiting muscles appeared to be PM, IS and DEf. They showed not only high mean activities but also large ranges of activity when fatigue was building up. The large range in activity can be explained by two reasons: First, the support scale represents a biomechanical unstable strength element where PM, IS and DEf are expected to work and counterbalance other muscles to stabilize the strength element. Second, the increase in fatigue is also expected to influence the muscle activity. As IS and DEf showed an overall decreasing tendency whereas PM increased in all subjects, it was concluded that PM is the overall limiting muscle. Furthermore, the subject specific analysis revealed interindividual strengths and weaknesses of the elite athletes.

References:

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Consideration of kinetic, potential and elastic energy acting on the center of mass while running**Authors:** Staudenmann D¹, Robadey J¹, Taube W¹¹Movement and Sport Science, Department of Medicine, University of Fribourg, Switzerland**Introduction:**

Kinetic and potential energies (E_k and E_p) have been determined to characterize the mechanical energetics of running and walking (Cavagna, Thys, & Zamboni, 1976). However, as in both locomotion types the legs also have an elastic behavior (Blickhan, 1989), the non-consideration of the elastic energy (E_e) biases the representativeness of such a biomechanical model. The aim of this study was to determine E_k , E_p and E_e affecting the center of mass in the sagittal plane during the phases of running (flight/stance). We investigated not only their mechanical energetic contribution but also considered how the elastic energy influences the total mechanical energy. Moreover, the correlation of the three energy components was analyzed during the different phases of running.

Methods:

Twelve healthy experienced male runners (37 ± 12 years; 69 ± 4 kg; 175 ± 5 cm) participated in the experiment. Subjects had to run at a self-selected gait velocity over four longitudinally aligned force plates, while full body kinematics was measured to determine the COM. Based on the COM trajectory in sagittal plane we determined potential (E_p), kinetic (E_k) and elastic energy components (E_e), from which we estimated the total mechanical energy (E_m), with and without E_e [cf. 1]. From these energies we calculated the mean, the peak-to-peak variation over time (ΔE_i) and the correlation for the different phases of running.

Results:

The lowest energy component was E_e , followed by E_k and E_p (16, 339, 685J) and no overall significant difference was found between phases, except for E_e (stance=28J, flight=0J). E_e had a minor effect on E_m , which was slightly larger for the flight vs. stance phase. The variations ΔE_e , ΔE_k , ΔE_p were about the same during stance (~50J) and significantly lower during flight (~25J). E_e had a considerable effect of 30% on ΔE_m , which was 50% lower during flight compared to stance. The correlation between E_k and E_p was $r=0.56$ during stance and $r=-0.63$ during the flight phase. During the stance phase, E_e was negatively correlated with E_k ($r=-0.63$) and E_p ($r=-0.94$).

Discussion:

The aim of this study was to consider the effect of E_k , E_p and E_e acting on the COM during the different phases (stance/flight) in running. E_e was substantially lower than E_k and E_p and therefore affected E_m only slightly. In contrast the peak-to-peak variation of the energies was substantially different between phases with an overall lower energy of 50% during flight compared to stance phase. This means that the main work was produced during the stance phase of running (cf. Hamner, Seth, & Delp, 2010). The additional consideration of E_e reduced the variation ΔE_m during the stance phase of running by 30%, which indicates improved energy conservation when considering E_e . The expected in-phase variation of E_k - E_p was only partly confirmed. Better correlations were found when comparing E_e - E_k and E_e - E_p showing an antiphase variation. It can be concluded that despite the relatively small contribution of E_e , it nevertheless influences the energy conservation during the stance phase of running by displaying considerably higher work expenditure during stance compared to flight phase.

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Zonal playfield attributes – A stochastic approach to subjective passing affordances in football**Authors:** Steiner S¹, Scherer M¹¹Institute of Sport Science, University of Bern, Switzerland**Introduction:**

According to the ecological view, coordination establishes by virtue of social context. Affordances thought of as situational opportunities to interact are assumed to represent the guiding principles underlying decisions involved in interpersonal coordination. It's generally agreed that affordances are not an objective part of the (social) environment but that they depend on the constructive perception of involved subjects. Theory and empirical data hold that cognitive operations enabling domain-specific efficacy beliefs are involved in the perception of affordances. The aim of the present study was to test the effects of these cognitive concepts in the subjective construction of local affordances and their influence on decision making in football.

Methods:

71 football players (M = 24.3 years, SD = 3.3, 21 % women) from different divisions participated in the study. Participants were presented scenarios of offensive game situations. They were asked to take the perspective of the person on the ball and to indicate where they would pass the ball from within each situation. The participants stated their decisions in two conditions with different game score (1:0 vs. 0:1). The playing fields of all scenarios were then divided into ten zones. For each zone, participants were asked to rate their confidence in being able to pass the ball there (self-efficacy), the likelihood of the group staying in ball possession if the ball were passed into the zone (group-efficacy I), the likelihood of the ball being covered safely by a team member (pass control / group-efficacy II), and whether a pass would establish a better initial position to attack the opponents' goal (offensive convenience). Answers were reported on visual analog scales ranging from 1 to 10. Data were analyzed specifying general linear models for binomially distributed data (Mplus). Maximum likelihood with non-normality robust standard errors was chosen to estimate parameters.

Results:

Analyses showed that zone- and domain-specific efficacy beliefs significantly affected passing decisions. Because of collinearity with self-efficacy and group-efficacy I, group-efficacy II was excluded from the models to ease interpretation of the results. Generally, zones with high values in the subjective ratings had a higher probability to be chosen as passing destination ($\beta_{\text{self-efficacy}} = 0.133$, $p < .001$, OR = 1.142; $\beta_{\text{group-efficacy I}} = 0.128$, $p < .001$, OR = 1.137; $\beta_{\text{offensive convenience}} = 0.057$, $p < .01$, OR = 1.059). There were, however, characteristic differences in the two score conditions. While group-efficacy I was the only significant predictor in condition 1 ($\beta_{\text{group-efficacy I}} = 0.379$, $p < .001$), only self-efficacy and offensive convenience contributed to passing decisions in condition 2 ($\beta_{\text{self-efficacy}} = 0.135$, $p < .01$; $\beta_{\text{offensive convenience}} = 0.120$, $p < .001$).

Discussion:

The results indicate that subjectively distinct attributes projected to playfield zones affect passing decisions. The study proposes a probabilistic alternative to Lewin's (1951) hodological and deterministic field theory and enables insight into how dimensions of the psychological landscape afford passing behavior. Being part of a team, this psychological landscape is not only constituted by probabilities that refer to the potential and consequences of individual behavior, but also to that of the group system of which individuals are part of. Hence, in regulating action decisions in group settings, informers are extended to aspects referring to the group-level.

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Lewin, K. (1951). In D. Cartwright (Ed.), *Field theory in social sciences: Selected theoretical papers by Kurt Lewin*. New York: Harper & Brothers.

Specific exercise interventions can reduce the symptoms of chemotherapy-induced peripheral neuropathy**Authors:** Streckmann F^{1,2}, Lehmann HC³, Faude O¹, Zahner L¹, Bloch W², Baumann FT²¹Department of Sport, Exercise and Health, University of Basel, Switzerland²Institute of Cardiovascular Research and Sport Medicine, German Sport University Cologne³Department of Neurology, University Hospital Cologne**Introduction:**

Chemotherapy-induced peripheral neuropathy (CIPN) is a highly prevalent and clinically relevant side-effect of chemotherapy (Wonders, Reigle, & Drury, 2010). Depending on the neurotoxic agent, 60-90% (Stubblefield et al., 2009) of patients are affected. The motor and sensory symptoms not only severely diminish patients' quality of life, but represent a decisive limiting factor for medical therapy, consequently affecting the clinical outcome (Stubblefield et al., 2009) To date approved and effective treatment options are lacking (Wonders et al., 2010) Promising results have now been achieved with specific exercise interventions.

Methods and Results:

In a first randomized, controlled trial (RCT) with lymphoma patients, (Streckmann, Kneis, et al., 2014) positive effects on motor as well as sensory symptoms of CIPN could be achieved with an exercise intervention, concomitant to therapy, comprising endurance-, strength- and sensorimotor training. Patients, who had exercised, showed improved peripheral deep sensitivity, balance control and level of activity, which enhanced their quality of life. Furthermore, 87% of the patients in the intervention group were able to reduce the symptoms of CIPN, while they persisted in the control group (0% reduction). A tendency towards a potentially preventive effect could also be detected. Lacking further references in oncology, we conducted a systematic review (Streckmann, Zopf, et al., 2014) investigating beneficial exercise interventions for patients with peripheral neuropathies independent of the pathophysiology. It revealed that for toxically-induced peripheral neuropathies such as CIPN, exercise interventions involving balance components were essential, while studies conducting endurance- or strength training alone showed no effect on the relevant symptoms. We therefore conducted a further RCT, isolating sensorimotor training (SMT) and comparing it to whole body vibration training (WBV). The two intervention groups were compared to an oncological control group as well as a healthy, age- and gender-matched control group. First analysis showed that both SMT and WBV not only proved feasible for patients with CIPN, but were able to improve reflex activity, peripheral deep sensitivity, balance control and quality of life.

Discussion:

We therefore propose that SMT as well as WBV are promising exercise interventions to reduce the symptoms of CIPN. (Streckmann, Rittweger, & Baumann, 2014) Consequently, specific exercise therapy should be taken more seriously as a supportive therapy for oncological patients.

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Contributions of peripheral and central mechanisms to performance reductions during finger tapping tasks**Authors:** Thomas F¹, Bächinger M², Bosshard A², Wenderoth N²¹Department of Sport Science, Universität Konstanz, Deutschland²Neural Control of Movement Lab, Dept. for Health Sciences and Technology, ETH Zürich, Schweiz**Introduction:**

Finger tapping of a predetermined sequence at submaximal speed causes a significant decrease in behavioural performance that can be observed after approximately 20s (Rickard, Cai, Rieth, Jones, & Ard, 2008). This phenomenon has been described by the term “reactive inhibition”, however the underlying mechanism has not been investigated so far and is currently unknown. The objective of the present study is to (A) disambiguate whether peripheral or central mechanisms lead to this progressive decrease in performance and (B) whether neurophysiological markers can be linked to the observed behavioural changes.

Methods:

Three experiments were conducted. All of them compared short periods of finger tapping (10sec tapping followed by a ≥ 30 sec break) to longer periods (≥ 30 sec tapping followed by a ≥ 30 s break) and subjects were instructed to tap a 5 element sequence repetitively as quickly and accurately as possible. Importantly, reactive inhibition is significantly stronger for ≥ 30 sec tapping than for 10sec tapping. Experiment 1 (n=3) applied supramaximal peripheral nerve stimulation (PNS) immediately after each tapping block to test whether reactive inhibition could be explained by changes at the neuromuscular junction (peripheral fatigue). Therefore, we compared the twitch peak force (TPF) of the resting m. opponens pollicis that was evoked after ≥ 30 sec compared to 10 sec of repetitive finger tapping. In experiment 2 (n=17) we used the same general procedure to test whether the performance difference for ≥ 30 sec versus 10 sec finger tapping would be reflected by altered cortical oscillations in the alpha-band (IAP) as measured by electroencephalography (EEG). In experiment 3 (n=4) we used transcranial magnetic stimulation (TMS) to test, whether short interval cortical inhibition (SICI) is differentially affected by ≥ 30 sec versus 10 sec finger tapping.

Results:

Tapping for ≥ 30 s resulted in significant slowing when the first 10sec were compared to the last 10sec (Wilcoxon, $p < 0.05$). Exp. 1 revealed no changes between the twitch peak force (TPF) after tapping compared to baseline values which would be consistent with peripheral fatigue, neither after ≥ 30 s nor after 10s of sequence tapping ($TPF_{30} = 0.75 \pm 0.16$ N, $TPF_{10} = 0.80 \pm 0.16$ N; m. \pm s.d.). Exp. 2 revealed a significant reduction (Wilcoxon, $p < 0.05$) in EEG alpha power after the ≥ 30 sec compared to the 10 sec tapping blocks and this effect was strongest over sensory-motor areas ($IAP_{10} = 0.055 \pm 0.044$ μ V/Hz, $IAP_{30} = 0.047 \pm 0.039$ μ V/Hz). Preliminary data of Exp. 3 showed an increase of 50% in SICI after the 40s sequence while SICI was 2% decreased after 10s sequence typing.

Discussion:

Since we did not observe changes in the twitch peak force between 10 and ≥ 30 seconds of tapping in experiment 1, we conclude that the reduction in performance during finger tapping tasks cannot be explained by peripheral fatigue. In the second experiment, we observed a reduction in alpha power after ≥ 30 sec sequence tapping strongly suggesting that indeed a central mechanism contributes to the reactive inhibition phenomenon. Our preliminary TMS results further suggest that GABA-ergic pathways in the motor cortex might become increasingly activated during prolonged tapping, leading to a reduction in motor output.

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Rickard, T. C., Cai, D. J., Rieth, C. A., Jones, J., & Ard, M. C. (2008). Sleep does not enhance motor sequence learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 34(4), 834.

Physical fitness level affects perception of chronic stress in military trainees**Authors:** Tuch C¹, Roos L², Wyss T²¹Karlsruhe Institute of Technology, Germany²Federal Institute of Magglingen, Switzerland**Introduction:**

Stress has become one of the most common causes for the outbreak of secondary diseases in Central Europe. Previous research has shown significant effects of stress on the quality of life (Gerber & Pühse, 2009). Recruits are frequently exposed to a stressful environment (Wyss, Scheffler, & Mäder, 2012). Because of the negative effects of long-term stress on psychophysiological wellbeing and the ensuing high injury and dropout rate during basic military training (BMT; Hofstetter, Mäder, & Wyss, 2012) psychological research investigating factors that influence the level of perceived stress (PS) in recruits and soldiers is needed. The present study aims to detect the influence of fitness level on PS, while correcting for the influence of moderating variables.

Methods:

The present study was part of a larger project on physical and mental health during BMT of the Swiss Armed Forces (Boesch et al., 2014). All subjects were recruits of the infantry training school in Aargau. Finally, complete data of 173 men were included in statistical analyses. The following data were used as independent variables: physiological fitness (consisted of five disciplines: progressive endurance run, standing long jump, seated shot put, trunk muscle strength test and one leg standing test), PS at week 1 of BMT, personality factors (“Big 5”), education level and leadership style. PS at week 11 of BMT was used as dependent variable. Maximal oxygen consumption (VO₂max) was calculated based on PER data. Fitness variables remaining in the final regression model were used to stratify volunteers in four performance groups for each fitness test.

Results:

Mean PS at week 11 was significant higher than in week 1 ($T = -10.561, p < .001$). Participants in the 1st quartile of VO₂max level reported significant higher PS level at week 1 and week 11 compared to the 4th quartile of VO₂max level. Level of increased PS from week 1 to week 11 was significant lower in participants with higher VO₂max. Values of VO₂max, as well as neuroticism, TL, PS at week 1, and education level have functions as predictors for the level of PS at week 11. Explained variance is at 28.1% ($R^2 = .281, F = 22.368, p < .001$).

Discussion:

The present study was carried out to investigate the risk factors for an increased stress level during BMT school. It is apparent that lower VO₂max, high neuroticism value, high level of PS at week 1 of BMT, and a higher education level resulted in a higher PS level after 11 weeks of BMT.

Transformational leadership style had a positive impact on the stress experience. Based on the results, it would seem advisable, that recruits receive an additional physical training session, in particular in the field of endurance capacity. Recruits may enhance performance levels and endurance prior the commencement of BMT by using training programs and guidelines. A further implication of this study may be the development and training of leaders.

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SelbsTanz: Selbstkonzeptfördernde Tanzvermittlung in der Schule zwischen BISSiger Wissenschafts- und unterrichtsnaher Praxisorientierung**Autor/innen:** Valkanover S^{1,3}, Berger R²¹Institut für Sportwissenschaft, Universität Bern, Schweiz²Institut Vorschulstufe und Primarstufe, Pädagogische Hochschule Bern, Schweiz³Fachdidaktikzentrum Sport, Pädagogische Hochschule Bern, Schweiz

Aus bildungspolitischer und curricularer Perspektive ist die Orientierung an werteorientiertem Sportunterricht an öffentlichen Schulen Standard. Demgemäss soll mit Sport- und Bewegungserziehung in der Schule neben dem Erschliessen der Sport-Kultur auch eine persönlichkeitsbildende Wirkung intendiert werden. Obwohl diese breite Zielorientierung im Selbstverständnis des Faches traditionell wichtig ist, waren bislang nur vereinzelt Forschungsbemühungen zu verzeichnen, die schulsportliche Wirkungen auf Aspekte der Persönlichkeit untersuchten. Mit der Berner Interventionsstudie Schulsport (BISS) (Conzelmann, Schmidt & Valkanover, 2011) wurde dazu eine bestehende Lücke geschlossen. Mit der Studie konnte u.a. der Nachweis erbracht werden, dass mit mehrwöchigen spezifischen Inszenierungen in den Bereichen soziales Lernen im Spiel, Wagniserziehung an Geräten sowie Erfahrungen des Leistens beim Laufen / Springen sowie im Fitnesstraining punktuell Facetten des Selbstkonzepts in beabsichtigter Weise verändert werden können. Zentrale Bausteine dieser positiven Selbstkonzeptförderung sind die im quasi-experimentellen Design der Studie als Treatment festgelegten Vermittlungsprinzipien Kompetenzerfahrung, reflexive Sportvermittlung und individualisierte Lernbegleitung.

In der BISS wurde das Bewegungsfeld „Darstellen / Tanzen“ nicht thematisiert, obwohl der tänzerischen Bewegung persönlichkeitsbildendes Potenzial attestiert wird: Diese fördere und entwickle neben Kreativität und Rhythmusgefühl auch den Selbstaussdruck (Kirsch, 2004). In der Präsentation des eigenen Körpers in Bewegung können Schülerinnen und Schüler dazu angeregt werden, den Körper differenziert kennenzulernen und ihn als Ausdrucks- und Gestaltungselement zu erfahren. Damit wird das Potenzial des tänzerischen Ausdrucks für die Stimulierung des Selbstkonzepts im Bereich der Körpersensibilität (emotionales Selbstkonzept), sowie in der Wahrnehmung und Bewertung der tänzerischen Fähigkeiten (physisches Selbstkonzept) deutlich. Mit der vorliegenden Studie wird das Potenzial des Bewegungsfeldes „Darstellen / Tanzen“ in der Schule für die Ausdifferenzierung körpernaher Selbstwahrnehmungen untersucht und dabei ein besonderes Augenmerk auf die Ausgestaltung der verwendeten Unterrichtsmaterialien gelegt. Es soll (a) der Frage nachgegangen werden, inwiefern eine an der individuellen Kompetenzentwicklung orientierte, reflexive Sportvermittlung durch „Darstellen / Tanzen“ einen positiven Effekt auf die Entwicklung des emotionalen und physischen Selbstkonzepts von Schülerinnen und Schülern hat. (b) Zudem interessiert die Qualität der eingesetzten Unterrichtsmedien.

Im Referat wird exemplarisch verdeutlicht, wie die wechselseitige Beeinflussung von Wissenschafts- und Praxisorientierung die Rahmung für die Ausarbeitung des Forschungs- und Entwicklungsdesigns des Projekts „SelbsTanz“ bildete, das (a) die oben formulierte Forschungsfrage nach wissenschaftlichen Kriterien bearbeiten lässt und (b) die zukünftige Zugänglichkeit der Erkenntnisse für die Praxis in Form von evaluierten Unterrichtsmaterialien in den Blick nimmt.

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Impairments of peripheral motion change detection during smooth pursuit eye movements**Authors:** Vater, C¹, Klostermann, A¹, & Hossner, E-J¹¹Institute of Sport Science, University of Bern, Switzerland**Introduction:**

In team sports the ability to use peripheral vision is essential to track a number of players and the ball. By using eye-tracking devices it was found that players either use fixations and saccades to process information on the pitch or use smooth pursuit eye movements (SPEM) to keep track of single objects (Schütz, Braun, & Gegenfurtner, 2011). However, it is assumed that peripheral vision can be used best when the gaze is stable while it is unknown whether motion changes can be equally well detected when SPEM are used especially because contrast sensitivity is reduced during SPEM (Schütz, Delipetkose, Braun, Kerzel, & Gegenfurtner, 2007). Therefore, peripheral motion change detection will be examined by contrasting a fixation condition with a SPEM condition.

Methods:

13 participants (7 male, 6 female) were presented with a visual display consisting of 15 white and 1 red square. Participants were instructed to follow the red square with their eyes and press a button as soon as a white square begins to move. White square movements occurred either when the red square was still (fixation condition) or moving in a circular manner with 6 °/s (pursuit condition). The to-be-detected white square movements varied in eccentricity (4 °, 8 °, 16 °) and speed (1 °/s, 2 °/s, 4 °/s) while movement time of white squares was constant at 500 ms. 180 events should be detected in total. A Vicon-integrated eye-tracking system and a button press (1000 Hz) was used to control for eye-movements and measure detection rates and response times. Response times (ms) and missed detections (%) were measured as dependent variables and analysed with a 2 (manipulation) x 3 (eccentricity) x 3 (speed) ANOVA with repeated measures on all factors.

Results:

Significant response time effects were found for manipulation, $F(1,12) = 224.31, p < .01, \eta_p^2 = .95$, eccentricity, $F(2,24) = 56.43; p < .01, \eta_p^2 = .83$, and the interaction between the two factors, $F(2,24) = 64.43; p < .01, \eta_p^2 = .84$. Response times increased as a function of eccentricity for SPEM only and were overall higher than in the fixation condition. Results further showed missed events effects for manipulation, $F(1,12) = 37.14; p < .01, \eta_p^2 = .76$, eccentricity, $F(2,24) = 44.90; p < .01, \eta_p^2 = .79$, the interaction between the two factors, $F(2,24) = 39.52; p < .01, \eta_p^2 = .77$ and the three-way interaction manipulation x eccentricity x speed, $F(2,24) = 3.01; p = .03, \eta_p^2 = .20$. While less than 2% of events were missed on average in the fixation condition as well as at 4° and 8° eccentricity in the SPEM condition, missed events increased for SPEM at 16° eccentricity with significantly more missed events in the 4 °/s speed condition (1 °/s: $M = 34.69, SD = 20.52$; 2 °/s: $M = 33.34, SD = 19.40$; 4 °/s: $M = 39.67, SD = 19.40$).

Discussion:

It could be shown that using SPEM impairs the ability to detect peripheral motion changes at the far periphery and that fixations not only help to detect these motion changes but also to respond faster. Due to high temporal constraints especially in team sports like soccer or basketball, fast reaction are necessary for successful anticipation and decision making. Thus, it is advised to anchor gaze at a specific location if peripheral changes (e.g. movements of other players) that require a motor response have to be detected. In contrast, SPEM should only be used if a single object, like the ball in cricket or baseball, is necessary for a successful motor response.

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Trainability of postural control in prepubertal children**Authors:** Wälchli M¹, Mouthon A¹, Ruffieux J¹, Keller M¹, Taube W¹¹Department of Medicine, Movement and Sport Science, University of Fribourg, Switzerland, Schweiz**Introduction:**

In the past, strong evidence was found that postural control can be enhanced by balance training in healthy young adults (Lesinski et al., 2015a) and older adults (Lesinski et al., 2015b). In contrast, evidence for improving postural control by means of balance training in children is much weaker. To our knowledge, only four studies scrutinized the impact of balance training on stance stability in healthy children. Three of them applied a more appealing training program on older children (10 to 14 years) and found improvements, whereas the fourth study used classical balance training without improved postural control in younger children (6-7 years; Granacher et al., 2011). Hence, it is not clear if the classical balance training or the young age of the children prohibited an impact in this study. To clarify this issue, the present study tested the effect of a stimulating, holistic, and playful balance training intervention in children aged 6 to 7 years.

Methods:

22 children were distributed to an intervention group (INT; 6.2±0.4 years) and a control group (CON; 6.0±0.6 years). The training was held during physical education lessons and lasted for 5 weeks with 2 sessions per week of 45 minutes. Postural control was assessed by centre of pressure sway measurements using the following tests: tandem stance, Romberg stance with eyes open, Romberg stance with eyes closed, double and single right leg stance (ST1L) on spinning top. Furthermore, the sway of the platform was analysed in double and single right leg stance on a free swinging platform (Posturomed). The Posturomed was also used to test postural reactions of the participants in response to anticipated and unanticipated perturbations (UA-PER). In addition, jump height of countermovement jumps and rate of force development while executing maximal ankle plantar flexions on an isokinetic device were measured.

Results:

The results are analysed as percentage difference of the performance from Pretest to Posttest as the difference in performance between children was very high. Significant improvements for the INT group could be found in ST1L ($p < 0.05$) and in UA-PER ($p < 0.01$). All other measured parameters did not show differences between INT and CON.

Discussion:

The present study shows evidence that balance training specifically aligned to children can enhance postural control in the prepubertal age. The age around 6 years represent an important milestone in postural control maturation because the balance system is reorganized and supraspinal centers are not yet fully developed. Nevertheless, the INT group, which is representing this age group, could significantly improve their performance in two different balance tests. These results indicate that young children are able to transfer their balance improvements from a holistic training regimen to specific tests.

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Fit of individual differences in self-regulation and situational or instructional framing in sports**Authors:** Wegner M¹, Grätzer R¹, Schüler J¹¹Institute of Sport Science, University of Bern, Switzerland**Introduction:**

Self-regulation processes support goal striving and have been previously investigated in sport science. Different theories on self-regulation (e.g., Kuhl, 2000; Higgins, 1997) propose two self-regulatory modes: In an approach mode, individuals focus on gaining success, they risk more, and show preferences for speed when performing an action. In an avoidance mode, persons try to avoid losses or failure, they tend to act carefully and less risky, and focus on precision rather than on speed. Previous studies mainly focused on regulatory fit between chronic self-regulation and instruction often not using controlled designs or not investigating a situational and instructional fit at the same time. In a series of four experimental and correlational studies we investigated whether a fit between a chronic self-regulatory mode and a situational or instructional framing benefits sports performance.

Methods:

In Study 1, twenty-three sport students aged $M = 22.6$ years ($SD = 1.2$) performed ten shots on a 1.4 meters distant mini basket with a foam ball. They either received an avoidance or an approach instruction. In Study 2, a control condition was added to the avoidance and approach instructions. Thirty-four sport students (age: $M = 22.2$, $SD = 1.5$) performed two times (baseline, instruction) ten basketball shots from free throw distance. Study 3 was a field study with high-performance badminton players ($N = 36$, age: $M = 18.2$, $SD = 4.8$) in which we investigated whether the situational framing of being ahead or behind in real competitive matches interacts with a person's chronic self-regulatory focus to predict performance. In Study 4, the chronic self-regulation focus (approach, avoidance) \times situation (approach, avoidance task) \times instruction (approach, avoidance) interaction was tested in a within-subjects design with forty volleyball players aged $M = 30.0$ ($SD = 9.3$) performing a service defense (avoidance) or smash defense (approach) task. Chronic self-regulation was assessed using a 17-item questionnaire measuring regulatory focus (promotion, prevention) in Studies 1, 2, and 4. In Study 3, chronic self-regulation was assessed using a 36-item questionnaire measuring action orientation (action, state orientation).

Results:

Results in Study 1 illustrate that sport students with a chronic avoidance focus benefit regarding their performance in the basketball task when they receive an avoidance instruction, $F(1,19) = 4.71$, $p = .04$. In Study 2, instruction and chronic self-regulatory focus interacted to predict performance, $F(2,28) = 4.56$, $p = .02$. Only approach-oriented individuals improved their performance in the control condition when they did not receive any instruction. In Study 3, situational cues (being ahead or behind) interacted with the individual difference in self-regulation, $F(1,35) = 4.18$, $p = .048$, with avoidance-oriented individuals showing better performance when being ahead and approach-oriented persons' performance benefiting from being behind. In Study 4, only a chronic self-regulation \times instruction interaction could be observed, $F(3,114) = 5.28$, $p = .005$. Approach-oriented players benefitted from approach instructions and avoidance-oriented from avoidance instructions.

Discussion:

Overall, the results of the four (quasi-)experimental and field studies suggest that players with a chronic avoidance focus might benefit from goal instructions while for approach-oriented players such goal instructions might not be needed. The results also suggest that a situational framing (e.g., three-way interaction) is less salient although in a field setting it might be of importance.

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A preliminary standing desk intervention in 10- to 12-years old primary school children – Effects on standing time measured by accelerometer, external observation and self-reports

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Introduction:

As sedentarism and sitting time are independent cardiovascular risk factors, it is essential to increase children's physical activity at school, where they spend most of the time in a sedentary position. Standing desks might be a promising means to reduce prolonged sitting and - in the long run - obesity and other physical and psychosocial conditions. This preliminary controlled study investigated the impact of standing desks on primary school level. We also examined the reliability and validity of several measurements of standing time, comparing self-reports with external observations and objective measures (by accelerometer) in a sample of 10-to 12-year-old school children.

Methods:

The classroom of 19 pupils of the intervention group (IG; age: 10.8±0.6 years, BMI: 18±3 kg/m²) was supplied with standing desks for each pupil and 11 weeks. The control group (CG) was taught sedentary (n = 19, age: 10.8±0.8 years, BMI: 19±4 kg/m²). Accelerometers (ActiGraph, wGT3X-BT) were used to objectively measure standing time during one week. Additionally, children of IG were asked to report their standing time using a daily self-report sheet. Their standing time was also observed by external assistants for 4 weeks. For comparisons of the standing time during lessons and breaks oneway ANOVAs were calculated. Subjectively and objectively measured standing times were analyses with intra-class correlations (ICC), paired t-tests and Bland-Altman-plots.

Results:

Standing time of IG was notably higher during the school day (lessons and breaks) in comparison to the CG (CG: 26.1%, IG: 30.6%, p = .03). The intra-class correlation coefficients between all measurement methods in the IG were moderate to high. Self-reported data yielded an underestimation of standing time during lessons in comparison to the ActiGraph-measurement. This subjective underestimation of standing time is also present in comparison to the external observation, however, lacked significance.

Discussion:

The school setting provides great potential to decrease sitting by increase standing time. Standing desks are one opportunity to increase physical activity. However, the promotion of physical activity in schools has to go beyond the establishment of standing desks. In order to improve the validity of self-reported physical activity data, subjective and objective measures from larger representative samples should be used to develop a correction formula for the economic assessment of physical activity by subjective measures.

Effects of local blood flow restriction and systemic hypoxia on repeated sprint leg cycling performance**Authors:** Willis SJ¹, Alvarez L¹, Millet GP¹, Borrani F¹¹Department of Physiology, Faculty of Biology and Medicine, Institute of Sports Sciences, University of Lausanne, Lausanne, Switzerland**Introduction:**

A severe hypoxic environment in the muscle tissue can be created by applying a blood flow restriction (BFR) to the limbs during exercise, which increases the contribution of the anaerobic energy system for ATP production and results in higher lactate and decreased pH levels in the blood (Abe et al., 2006; Fujita et al., 2007). Currently, there has been no previous research investigating the effect of BFR on repeated sprint ability (RSA) as well as the comparison and combination of systemic hypoxia. Therefore, the aim of this study was to evaluate RSA leg cycling performance between multiple levels of BFR and hypoxia.

Methods:

Eleven well-trained men (n, 6) and women (n, 5) (26.7±4.2 yrs, 68.0±14.0 kg, 171.9±11.6 cm) performed ten sessions (one familiarization and nine test sessions). During familiarization, pulse elimination pressure was determined via Doppler ultrasound, followed by the protocol with RSA. Each subsequent test session included RSA until exhaustion or task failure (<70rpm, <50% of mean power) in nine randomized conditions (0%, 45%, 60%BFR; and 400m, 2000m, 3800m simulated altitude, respectively). Change in isometric peak force (N) and muscle activation (root mean square, RMS) were assessed before and after RSA. Number of sprints, mean power output (W), total work (kJ), maximal heart rate (HRmax, bpm), oxygen saturation (SpO₂, %), blood lactate (Lac, mmol/L), and rating of perceived exertion (RPE) for legs and breathing (Borg scale 6-20) were obtained. Two way repeated measures ANOVA were performed to assess differences pre- to post- (condition x time) and between conditions (hypoxia x occlusion) with Bonferroni post-hoc test (p<0.05).

Results:

The number of sprints in RSA decreased across conditions as BFR and hypoxia increased (P<0.001) (29.8±13.7 in 400m-0%BFR vs. 4.0±3.1 in 3800m-60%BFR, interaction F=4.9, P=0.003), as did total work (161.8±80.8 vs. 21.8±16.7 kJ, respectively, P<0.001, interaction F=6.7, P<0.001), and HRmax (185.0±9.5 vs. 166.5±19.0 bpm, P<0.001). Mean power during RSA demonstrated significant differences between occlusion 0% vs. 45%, 0% vs. 60%, and 45% vs. 60% at 2000m and with 45% vs. 60% at 3800m (P=0.014). Further, when normalized by sprint, the decrease in mean power was more important as BFR and hypoxia increased (between 11.2% and 35.0%, P<0.001). The minimum SpO₂ progressively decreased with increased hypoxia (P<0.001) (93.8±4.5 % in 400m-0%BFR vs. 76.5±6.0 % in 3800m-0%BFR). While RPE of the legs increased with increasing BFR (P<0.001) (17.7±2.1 in 400m-0%BFR vs. 19.7±0.6 in 3800m-60%BFR), RPE in breathing decreased (P<0.001) (18.3±1.4 vs. 16.1±1.8, respectively). Lac decreased as BFR increased to 60%BFR (P<0.001) (8.6±5.2 in 2000m vs. 6.9±4.0 in 3800m). The peak force decreased from pre- to post-RSA as BFR and hypoxia increased (range: 3.4 vs. 54.3% difference, P<0.001) also the RMS (range: 6.0 to 46.7% difference, P<0.001).

Discussion:

As expected, RSA was further decreased by higher levels of BFR as well as hypoxia. We speculated the decreased power output induced by decreased force generation and muscle activation as severity increased may be due to greater deoxygenation as well as possible central drive alteration. Thus, it is of interest to further investigate the mechanisms of BFR and hypoxia in repeated sprint training.

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Die Frühspezialisierung von Juniorennationalspielern im Fussball: Ein Vergleich zweier Generationen**Autor/innen:** Zuber C¹, Zibung M¹, Conzelmann A¹¹Institut für Sportwissenschaft, Universität Bern, Schweiz**Einleitung:**

Die Nachwuchsarbeit im Schweizer Fussball ist seit 1995 stark professionalisiert worden, was sich in den letzten 15 Jahren in mehrere internationale Erfolge niedergeschlagen hat. Im Hinblick auf den sportlichen Erfolg hat sich dabei gezeigt, dass sich die Karrieren der erfolgreichsten Schweizer Spieler, deren Förderung in die ersten Jahre dieser Professionalisierung fällt, bereits in der Sampling Phase (Côté, 1999) durch eine frühe Spezialisierung beschreiben lässt (Zibung & Conzelmann, 2013). Die Trainingsumfänge beinhalten v.a. Clubtraining und viel freies Spiel ausserhalb des Clubs oder fussballnahe andere sportliche Aktivitäten. In diesem Beitrag wird der Frage nachgegangen, inwiefern sich die in den folgenden Jahren nochmals akzentuierte Professionalisierung auf die sportlichen Karrieren der aktuellen Generation von talentierten Fussballspielern ausgewirkt hat.

Methode:

$N = 32$ Juniorennationalspieler mit mind. 1 Aufgebot in die U15 oder U16 Nationalmannschaft (Jg. 99; Stichprobe A) werden mit $n = 151$ ehemaligen Juniorennationalspielern (Jg. 81-87; Stichprobe B aus Zibung & Conzelmann, 2013) in Bezug auf relevante Indikatoren zur Frühspezialisierung verglichen. Dafür wurden die beiden Stichproben in Anlehnung an Zibung und Conzelmann (2013) mittels t -Tests ($p < .05$) bezüglich folgender Indikatoren für Frühspezialisierung verglichen: Alter beim Beginn freies Fussballspiel und beim ersten Clubeintritt, Trainingsstunden im Club, freies Fussballspiel sowie sportliche Aktivitäten neben dem Fussball (jeweils bis 12-jährig). Die Variablen wurden in beiden Studien retrospektiv per Fragebogen erfasst.

Resultate:

Die Spieler der jüngeren Generation haben bis 12 Jahre weniger Stunden frei Fussball gespielt ($M_A = 2016.6$, $SD_A = 1107.1$) als die Spieler der älteren Generation ($M_B = 2535.5$, $SD_B = 1277.3$) ($t(50.1) = 2.34$, $p = .02$, $d = .66$). Gleichzeitig haben sie neben dem Fussball weniger andere sportliche Aktivitäten aufzuweisen ($t(68.0) = 2.53$, $p = .01$, $d = .61$). In den Variablen Trainingsstunden im Club ($M_A = 923.0$, $SD_A = 166.6$; $M_B = 967.0$, $SD_B = 287.1$), Alter beim Beginn des freien Fussballspiels ($M_A = 4.08$, $SD_A = 1.5$; $M_B = 4.36$, $SD_B = 1.2$) und beim ersten Clubeintritt ($M_A = 5.75$, $SD_A = 1.0$; $M_B = 6.07$, $SD_B = 1.3$) unterscheiden sich die beiden Stichproben nicht.

Diskussion:

Der Vergleich der beiden Stichproben zeigt, dass es in den letzten 15 Jahren zu einer Veränderung der Trainingsumfänge von Juniorennationalspielern gekommen ist. Die aktuelle Generation von Juniorennationalspielern spielt neben dem Clubtraining weniger frei Fussball und betreibt aber auch weniger andere Sportarten als die Juniorennationalspieler vor 10-15 Jahren. Ob vermehrte schulische Anforderungen diesen Rückgang in der generellen sportlichen Aktivität verschulden, müsste in der Folge weiter untersucht werden. Ebenso bleibt offen, ob die Einschätzung der Stichprobe B, aufgrund des relativ langen Zeitraums, der zwischen der Erhebung und dem zu erfassenden Zeitraum liegt, zu einer Antwortverzerrung und damit einer Erhöhung der geschätzten Trainingsstunden geführt hat.

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