21e SYMPOSIUM

VERENIGING VOOR KINESIOLOGIE

2 december 2016

Universiteit Gent

‘TAKE IN, MOVE OUT’

21e Symposium van de Vereniging voor Kinesiologie

‘TAKE IN, MOVE OUT’

Over voeding en beweging

Editor: Jan Boone

VOORWOORD

Beste deelnemer,

Van harte welkom op ons 21ste symposium van de Vereniging Kinesiologie: **"Take in move out: over voeding en bewegen"**. Vorig jaar sloeg de Vereniging Kinesiologie de handen in elkaar met BLOSO (Sport.Vlaanderen ondertussen) Topsport om een eerste colloquium rond Topsport & Wetenschap te organiseren. Het centrale thema dat we toen in voorbereiding hadden, kon dus na een jaartje terug opgevist worden.

In de voormiddag komen drie sprekers aan bod die vanuit een energie-opname en/of energieverbruik standpunt de rol van voeding en beweging in het al dan niet behouden/bekomen van een gezond gewicht, activering van fysieke activiteit en de specifieke doelgroep van (top-)atleten komen toelichten.

De mondelinge presentaties en posterpresentaties in de (na)middag tonen het brede onderzoeksveld van de bewegings- en revalidatiewetenschappen, door jonge bewegingswetenschappers gepresenteerd. De verschillende bijdrages leveren een brede wetenschappelijke kijk op aspecten van (top)sport, beweging, sedentair gedrag en revalidatie over het gehele leeftijdsbereik en vertalen zo het multidisciplinaire karakter van onze vereniging. Zij dingen mee naar de Gaston Beunen VK-prijzen voor jonge onderzoekers, financieel ondersteund door RsScan. We kijken ernaar uit om zowel de masterstudenten, die hun eerste resultaten komen voorstellen, als de doctoraatsstudenten die al even onderweg zijn in hun wetenschappelijk traject hun werk met passie te horen voorstellen.

Voor de beste wetenschappelijke bijdrage met een (in-)directe toepassing naar de trainingspraktijk wordt de VTS-prijs (ondersteund door de Vlaamse Trainersschool) uitgereikt. In de latere namiddag laten we drie 'pas gedoctoreerde' PhD studenten aan het woord om hun traject voor te stellen.

Graag willen we ook onze nieuwe bestuursploeg voorstellen op de Algemene Vergadering en jullie uitnodigen om mee te werken aan de nieuwe website www.verenigingkinesiologie.be (onderzoeksgerelateerde foto's, update joblist, aankondiging doctoraten,…).

Graag wil ik ook de bestuursleden en collega's uit UGent bedanken om de praktische organisatie van dit Symposium voor hun rekening te nemen.

Als 'forum' willen we u een fijne wetenschaps-dag aanbieden, maar vooral ook de gelegenheid om elkaar te ontmoeten, te leren kennen en voor de al wat ouderen onder ons nog eens 'bij te praten'.

Martine Thomis

Voorzitter Vereniging Kinesiologie

PROGRAMMA SYMPOSIUM Take in, Move out

9u Registratie en welkom

9u15 Verwelkoming

9u20 Tom Deliëns (VUBrussel) – Gewichtstoename en energiebalans gerelateerd gedrag bij universiteitsstudenten

9u45 Ragnar Van Acker (VIGEZ) – De brug van fysieke inactiviteit naar startende sportparticipatie

10u10 Stephanie Scheirlynck (sportdiëtiste) – Sportvoedingsadvies in de praktijk

10u35 Koffiepauze

10u50 Mondelinge presentaties sessie I (Gaston Beunen prijs)

12u05 Broodjeslunch met van 12u30 tot 13u15 posterwandeling (Gaston Beunen prijs)

13u15 Mondelinge presentatie sessie II (Gaston Beunen prijs)

14u30 Lennert Goossens (UGent) – Primary Prevention of musculoskeletal sport injuries in physical education teacher education students

14u55 Koffiepauze

15u15 Sara Knaeps (KULeuven/UGent) - Physical activity, sedentary behaviour and physical fitness: Associations with cardiometabolic health outcomes

15u40 Bert Celie (UGent) - Non-invasive screening for peripheral oxygenation dysfunction in healthy and pathological populations

16u05 Bekendmaking Gaston Beunen prijs (SPONSOR RsScan)/VTS prijs

16u15 Receptie

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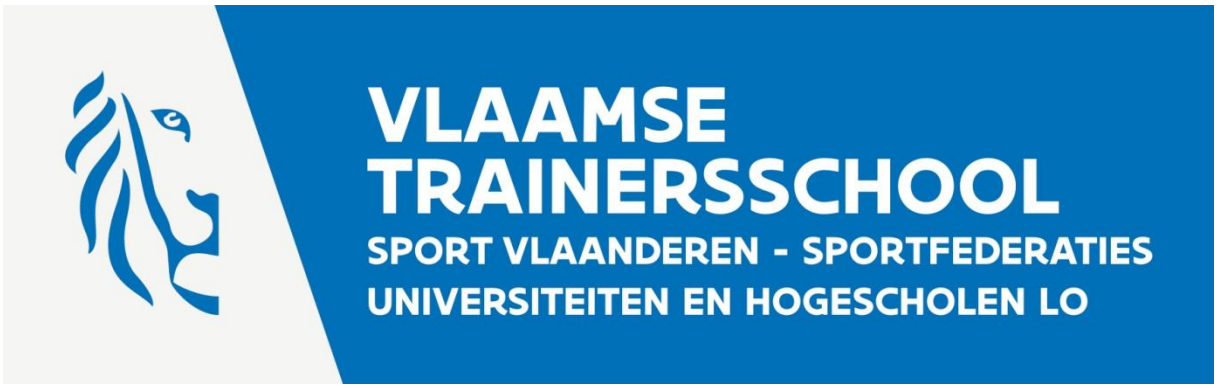

Ochtendsessies 9u20-10u35

Het ochtendprogramma wordt traditioneel ingevuld door keynote lectures gegeven door specialisten in het topic van het symposium. Dit jaar worden deze verzorgd door Tom Deliëns, Ragnar Van Acker en Stephanie Scheirlynck, die elk vanuit hun eigen invalshoek en expertise het topic zullen benaderen gaande van voeding/beweging in functie van gezondheid tot voedingsadvies in functies van sportprestaties.

Tom Deliëns (VUBrussel) – Gewichtstoename en energiebalans gerelateerd gedrag bij universiteitsstudenten.

Ragnar Van Acker (VIGEZ) – De brug van fysieke inactiviteit naar startende sportparticipatie

Stephanie Scheirlynck (sportdiëtiste) – Sportvoedingsadvies in de praktijk

Middagsessie 14u30-16u05

In de middagsessie stellen een aantal recent gedoctoreerden in het domein van de bewegings-en gezondheidswetenschappen hun doctoraatsonderzoek voor.

Lennert Goossens (UGent) – Primary prevention of musculoskeletal sport injuries in physical education teacher education students

Sara Knaeps (KULeuven/UGent) - Physical activity, sedentary behaviour and physical fitness: Associations with cardiometabolic health outcomes

Bert Celie (UGent) - Non-invasive screening for peripheral oxygenation dysfunction in healthy and pathological populations

Deelnemers Gaston Beunen Mondelinge presentatie

Iedere jonge onderzoeker die zijn doctoraat nog niet verdedigd heeft kan deelnemen aan deze presentatiewedstrijd. De jury selecteert vooraf uit de ingezonden abstract maximaal 12 mondelinge presentaties. De kandidaten krijgen 10 min tijd om hun werk te presenteren waarna er gedurende 3 min vragen kunnen gesteld worden door de jury of het publiek. De winnaar van deze wedstrijd krijgt een prijs van 150 euro, terwijl de als 2e en 3e gerangschikten geproclameerd worden.

Dit jaar zijn de volgende deelnemers geselecteerd:

SESSIE 1: 10u50-12u05

- Laura Blanquaert (UGent)
- Jeroen Van Cutsem (VUBrussel)
- Emmanuel Jacobs (UAntwerpen)
- Kevin Caen (UGent)
- Niels Mertens (KULeuven)
- Sara De Lepeleere (UGent)

SESSIE 2: 13u15-14u30

- Lieselot Decroix (VUBrussel)
- Vicky Van Stappen (UGent)
- Chiel Poffé (KULeuven)
- Charlotte Hiroux (KULeuven)
- Maarten Caspers (KULeuven)
- Janne Bouten (UGent)

Body creatine, but not carnitine and carnosine stores, decline by a 6-month vegetarian diet in omnivorous women

Blancquaert, L.[1], Baguet, A.1, Bex, T.[1], Everaert I.[1], De Henauw S.[2], Constantin-Teodosiu, D.[3], Greenhaff, P.[3], Derave W.[1]

[1] Department of Movement and Sports Sciences, GHENT University (Ghent, Belgium)

[2] Department of Public Health, GHENT University (Ghent, Belgium)

[3] School of Biomedical Sciences, University of Nottingham (Nottingham, UK)

Balanced vegetarian diets are very popular and contain health-promoting characteristics, although they are nearly absent in carninutrients such as creatine, carnitine and carnosine (1). Very few longitudinal intervention studies investigating the effect of a vegetarian diet on carninutrient metabolism currently exist. We aimed to investigate the effect of transiently switching omnivores onto a vegetarian diet for 6 months on the muscle and plasma creatine, carnitine and carnosine homeostasis.

In a 6-month intervention, 40 omnivorous women were divided in three groups: control (continued omnivorous diet), vegetarian diet without supplementation (Veg+Pla), and vegetarian diet combined with daily beta-alanine (0.8-0.4 g/day) and creatine supplementation (1 g creatine monohydrate/day) (Veg+Suppl). At baseline (0M), after 3 months (3M) and again after 6 months (6M), subjects performed an incremental cycling test and fasting venous blood samples, muscle biopsies and 24 hr urine samples were collected. Muscle carnosine levels were measured by ^{1}H-MRS.

Plasma creatine and total muscle creatine concentrations declined from 0M to 6M in the Veg+Pla group ($p = 0.008$ and $p = 0.025$, respectively), while the opposite occurred in the Veg+Suppl group ($p = 0.008$ and $p = 0.007$, respectively). None of the carnitine-related compounds in plasma or muscle showed a significant interaction effect. Carnosine did not change over time in the Veg+Pla group, nor in the control group, but significantly increased in the Veg+Suppl group in both soleus ($p < 0.001$) and gastrocnemius ($p = 0.001$) muscle. VO_{2max} and time to exhaustion of the incremental cycling test did not differ between the experimental groups at baseline, neither did it change during the 6-month intervention period.

Collectively, these data demonstrate that body creatine concentrations decline by a 6-month vegetarian diet in omnivorous women, which can be restored by daily creatine supplementation, whereas carnitine and carnosine homeostasis is not affected by a 6-month vegetarian diet.

(1) McCarty (2004). Medical Hypotheses 63: 426-433.

Mental fatigue impairs sport-specific reaction time.

Jeroen Van Cutsem[1,2], Kevin De Pauw[1], Samuele Marcora[2], Romain Meeusen[1,3], Bart Roelands[1].

[1] Human Physiology research group, Vrije Universiteit Brussel, Brussels, Belgium

[2] Endurance research group, University of Kent at Medway, Chatham Maritime, UK

[3] James Cook University, Queensland, Australia

Purpose: Besides endurance, recent research has reported mental fatigue also impairs manual dexterity [1] and slip anticipation [2]. Therefore we sought to examine the effect of a mentally fatiguing task on motor-reaction time (M-RT) performance. **Methods:** A M-RT task was developed with Fitlight-hardware and –software in order to evaluate the effect of mental fatigue on simple and response inhibition stimuli and on stimuli in the central and peripheral visual field. In the M-RT task, pads 1 up to 7 would aluminate randomly one after the other in the color red, green, yellow or blue. If a pad lighted up in red, green or yellow participants had to react forward (simple stimuli). If a pad lighted up in blue, participants could not react forward and had to put out the pad behind them (8; response inhibition stimuli). Eleven untrained healthy subjects (age: 25 ± 4y; 6 female, 5 male) performed two experimental trials in a randomized crossover order. Participants first completed a baseline M-RT task (~6min30sec), followed by a Flanker task. Next they performed either a 90min mentally fatiguing task (Stroop task; MF) or watched a 90min documentary (CON). Immediately thereafter again the Flanker task and the M-RT task were completed. Accuracy (ACC) and reaction time (RT) were followed up in all tasks but the documentary. In addition physiological and psychological measures were assessed during the protocol. Repeated measures ANOVA's were used to analyze the data. **Results:** ACC on both the Stroop ($p=0.021$) and the Flanker task (~3%; $p=0.048$) decreased over time in MF. Participants got faster over time on the Stroop task in MF ($p\leq0.004$). RT on the Flanker task did not change over time in both MF and CON. Subjectively, higher ($p=0.001$) mental fatigue was perceived in MF compared to CON. Concerning the M-RT-performance, no effects were observed for the simple stimuli. For the response inhibition-stimuli, only in MF the participants became significantly slower in time (~7.5%; $p=0.007$). **Conclusion:** Mental fatigue negatively affects sport-specific response inhibition-RT. Therefore, besides endurance, sport-specific cognition also appears to be impaired by mental fatigue. The impairment in RT was independent from the visual-field position of the stimulus and was not perceived by the participants.

(1) Duncan MJ, et al. Mental fatigue negatively influences manual dexterity and anticipation timing but not repeated high-intensity exercise performance in trained adults. Res Sports Med, 2015. 23(1): p. 1-13.

(2) Lew FL and Qu X. Effects of mental fatigue on biomechanics of slips. Ergonomics, 2014. 57(12): p. 1927-32.

Motor learning processes in theatre performers

Jacobs Emmanuel[1], Roussel Nathalie[1], Gielen Jan[2], Hallemans Ann[1]

[1]REVAKI, University of Antwerp

[2]Dept. of Radiology, Universitary Hospital of Antwerp

Introduction: Biomechanical research enables us to objectify movement patterns and to broaden our scientific insights in the physical loading of certain movements. Such research is crucial in e.g. athletes and dancers, who daily undergo extreme amounts of physical activity. Theatre performers of Jan Fabre also experience high physical loadings during their exercises, but were not researched yet, apart from one earlier study of this current research group.

Method: Thirteen unexperienced theatre performers were researched by using two 3D measurements: before and after seven workshops on exercises of Jan Fabre, the Old Man Exercise was analysed in a specialized biomechanical motion laboratory (M²Ocean, UZA). A Principal Component Analysis (PCA) was performed to reduce the large amount of kinematic variables into a comprehensive amount of new factors. These factors were then compared based on the effect of workshop (before/after) and the effect of trial number, by using a univariate analysis.

Results: The PCA resulted in six new factors: 1) *Pelvic Motion*, 2) *Speed of Progression*, 3) *Bended Leg Position*, 4) *Foot Motion*, 5) *Bending Leg Motion* and 6) *Trunk Position*. No significant effects of workshop, nor of trial number could be found on these six newly composed factors. However, a significant interaction effect could be demonstrated for factors 1, 3, 4 and 5 (workshop-performer) as well as for factor 6 (workshop-trial number).

Discussion: The absence of a global learning effect (based on workshop) might be explained by the low amount of workshops the performers took part in. The factor values showed a highly variable pattern between the different trials, which explains the absence of a global effect of trial number. When comparing factors 1, 3, 4 and 5 between the performers and before/after the workshops, high consistencies as well as high variations could be found, which clarifies the interaction effect of workshop-performer. Factor 2 showed no interaction effects, which might be explained by a consistent moving speed before and after the workshops, as well as throughout all of the trials. Since a slow moving speed was one of the most clearly defined exercise modalities, this phenomenon can easily be understood in the context of the Old Man exercise. The interaction effect of workshop-trial number for factor 6 demonstrated a more straightened trunk starting position after the workshops, as well as less trunk straightening throughout the exercise.

The interrelationship of critical power, respiratory compensation point and breakpoints in muscular and cerebral oxygenation: the effect of interval training.

Caen K, Vermeire K, Bourgois J, Boone J

Department of Movement and Sports Sciences, Ghent University

Introduction: Traditional threshold concepts such as critical power (CP) or respiratory compensation point (RCP) are based on whole-body measurements, which are carried out not directly at the level of the working muscles. Recently, near-infrared spectroscopy (NIRS) technology has been suggested as a useful alternative, since it allows to identify breakpoints in the local balance between muscle oxygen delivery and consumption. Regarding the fact that the patterns in both muscle and brain oxygenation might be reflected in the acute whole-body response during exercise, prior studies attempted to relate and compare these breakpoints to other classically used thresholds. However, only cross-sectional research was conducted and results remain conflicting in the current literature. Therefore, this study investigated the interrelationship of CP, RCP and the breakpoints in muscle $[mHHb]_{bp}$ and cerebral $[CO_2Hb]_{bp}$ oxygenation by the implementation of a 6-week interval training period.

Methods: Ten male, physically active, students (21.8 ± 1.2 year, 52.5 ± 3.7 $ml.min^{-1}.kg^{-1}$) volunteered to take part in this study. Participants completed a 6-week interval training period on a bicycle ergometer in the laboratory. Based on the results of a ramp incremental exercise test, CP was determined by four exhaustive trials at different power outputs between 75% and 105% P_{max}. RCP was defined as the inflection point of the V_E versus V_{CO2} slope and $[mHHb]_{bp}$ and $[CO_2Hb]_{bp}$ were calculated by the use of a double linear model. Data were expressed as the VO_2 associated with each threshold.

Results: All thresholds, apart from CP, showed a significant increase in VO_2 after completion of the training intervention. Before training, no differences between the metabolic intensity of CP, RCP, $[mHHb]_{bp}$ and $[CO_2Hb]_{bp}$ were found and all thresholds occurred within 85 and 95% VO_{2max}. After training, results revealed a modified interrelationship, since only RCP and $[CO_2Hb]_{bp}$ showed similar VO_2 values. Multiple correlations between the thresholds were observed, both before and after the training period. However, correlations between the pre-post VO_2 change for each threshold were not significant, except for two.

Conclusion: Although CP, RCP, $[mHHb]_{bp}$ and $[CO_2Hb]_{bp}$ showed multiple signs of interrelation within a narrow range of VO_2, training-induced changes in the VO_2 response of each threshold were not correlated. Therefore, and despite physiological arguments supporting the existence of a mechanistic link, results of the present study highly question the equivalence of the investigated thresholds.

The power of competence support by coaches and athlete leaders

Mertens, N., Boen, F., Vande Broek, G., Vansteenkiste, M., &. Fransen, K.

Onderzoeksgroep Fysieke activiteit, Sport en Gezondheid, KU Leuven

This presentation includes two experimental field studies in sports teams that investigated the impact of leaders' positive feedback on athletes' competence satisfaction, intrinsic motivation, and performance. More specifically, the impact of coaches and athlete leaders was compared. In Study 1 (N = 120), teams of five male basketball players were asked to complete an interactive basketball task twice, where the first test serves as baseline measure. In the second test session, each of the teams was randomly allocated to either a control condition (i.e., no competence support) or one of three experimental conditions in which either (a) the coach (i.e., a research confederate); (b) the athlete leader (identified through social network analysis); or (c) both provided competence-supportive feedback to the team. Study 2 (N = 126) adopted a similar design but strived for a higher ecological validity by using complete teams and the real coach of the team.

In line with the Self-Determination Approach, we found that both coaches and athlete leaders impacted athletes' competence satisfaction, their intrinsic motivation, and their performance by providing positive feedback. It should be noted, though, that the positive impact of the coach on competence satisfaction and intrinsic motivation was only found in Study 1, in which feedback was provided by an external research confederate who was trained in providing competence support. This positive impact of the coach did not emerge Study 2, where the real coach of the team was asked on the spot to provide competence support.

We can thus conclude that coaches need to have received a specific training in order to provide effective competence-supportive feedback. In contrast, asking athlete leaders on the spot to provide positive feedback, resulted in an immediate effect on both the motivation and performance of their teammates. The study findings thus highlight that, besides the coach, also athlete leaders can play an important role in fostering teammates' competence satisfaction, thereby nurturing their intrinsic motivation, and enhancing their performance.

The Effect of an online Video Intervention 'Movie Models' on specific Parenting Practices and Parental Self-efficacy related to Children's healthy Diet, Physical Activity and Screen-time: a Quasi Experimental Study

Sara De Lepeleere[1], Ilse De Bourdeaudhuij[1], Greet Cardon[1], Maïté Verloigne[1]

[1] Department of Movement and Sport Sciences, Ghent University, Watersportlaan 2, 9000 Ghent, Belgium

Background: Through the performance of parenting practices, parents have a large impact on children's healthy diet, physical activity and sedentary behavior. Therefore, we investigated the effect of a health promoting online video intervention for parents ('Movie Models') on children's diet, physical activity (PA) and screen-time, and on specific parenting practices and parental self-efficacy related to these parenting practices. The online videos are delivered to parents of primary schoolchildren and were based on real-life scenarios.

Methods: A two-armed, quasi experimental design was used. Parents of primary schoolchildren were recruited between November-December 2013 by spreading an appeal in social media and by contacting primary schools. Participating parents were predominantly of high socio-economic status (SES) (83.1%), and only 6.8% of children were overweight/obese. Intervention group participants were invited to watch online videos for four weeks. Specific parenting practices, parental self-efficacy, healthy diet, PA and screen-time of the child were assessed at baseline (T0), and one (T1) and four (T2) months post baseline. Repeated Measures (M)ANOVAs were used to examine intervention effects. The potential moderating effect of age and gender of the child, and parental SES was also examined.

Results: Between T0 and T2, no significant intervention effects were found on children's healthy diet, PA or screen-time. Most significant intervention effects were found for more complex parenting practices (e.g. an increase in motivating the child to eat fruit). Subgroup analyses showed that the intervention had more effect on the actual parenting practices related to healthy diet, PA and screen-time in parents of older children (10-12 years old), whereas intervention effects on parental self-efficacy related to those behaviors were stronger in parents of younger children (6-9 years old).

Conclusions: 'Movie Models' was effective in increasing some important parenting practices and parental self-efficacy related to healthy diet, PA and screen-time in children. Therefore, the current study is an important first step in promoting effective parenting-related factors, and possibly increasing children's healthy diet and PA, and decreasing screen-time.

Can the Lamberts Submaximal Cycle Test reflect overreaching in professional female cyclists?

Lieselot Decroix, Robert Lamberts, Romain Meeusen

Vrije Universiteit Brussel

Purpose: The Lamberts and Lambert Submaximal Cycle Test (LSCT) consists of 3 stages during which cyclists cycle for 6 minutes at 60%, 6 minutes at 80% and 3 minutes at 90% of their maximal heart rate, followed by one minute recovery. It was the aim of this study to determine if the LSCT is able to reflect a state of functional overreaching in professional female cyclists during an 8 day training camp and the following recovery days.

Methods: Six professional female cyclists performed an LSCT on day 1, day 5 and day 8 of the training camp and 3 days after the training camp. During each stage of the LSCT, power output and rating of perceived exertion (RPE) were determined. Training diaries and profile of mood status (POMS) were also completed and results were analyzed by repeated measures ANOVA to verify differences between day 1, day 5, day 8 and day +3. To investigate differences in performance parameters (P60, P80, P90, RPE, HRR), a contemporary approach of data analysis using magnitude-based interferences was employed, where chances for meaningful changes (larger than normal day-to-day variability) were assessed as "likely" (> 75-95%), "very likely" (> 95-99%) and. "most likely" (> 99%).

Results: Power output and RPE during the 2nd stage of the LSCT were "likely" higher on day 5 and "very likely" (power) and "most likely" (RPE) higher on day 8, compared to day 1. During the 3rd stage of the LSCT, power output and RPE were "likely" higher on day 5 and "very likely" (power) and "likely" (RPE) higher on day 8, compared to day 1. On day 8, increased power output and RPE during these stages were accompanied by the inability to reach 90% of their maximal heart rate. All athletes reported increased feelings of fatigue ($F(2,10)=17.43$; $p=.001$) and muscle soreness ($F(2,10)=6.5$; $p=.02$). No significant changes were found in any of the parameters of the POMS (anger, vigor, fatigue, depression), nor in the energy-balance (vigor-fatigue) during and after the training camp. After 3 days of recovery, all parameters of the LSCT returned to baseline, indicating a state of *functional* overreaching during the training camp.

Conclusion: The LSCT can be used to reflect a state of functional overreaching in elite professional female cyclists during an 8 day training camp and the following recovery days.

Daily patterns of European preschoolers' objectively measured step counts: results from the ToyBox-study

Vicky Van Stappen[1], Delfien Van Dyck[1], Julie Latomme[1], Ilse De Bourdeaudhuij[1], Luis Moreno[2], Piotr Socha[3], Violeta Iotova[4], Berthold Koletzko[5], Yannis Manios[6], Odysseas Androutsos[6], Greet Cardon[1], Marieke De Craemer[1], on behalf of the ToyBox-study group.

[1]Ghent University, Department of Movement and Sports Sciences, Watersportlaan 2, 9000 Ghent, Belgium; [2]GENUD (Growth, Exercise, Drinking behaviour and Development) Research Group, University of Zaragoza, Spain; [3]Piotr Socha, Children's Memorial Health Institute, Warsaw, Poland; [4] Clinic of Paediatric Endocrinology, Medical University Varna, Bulgaria; [5]Berthold Koletzko, Dr. von Hauner Children's Hospital, University of Munich Medical Centre, Munich, Germany. [6]Yannis Manios, Deportment of Nutrition and Dietetics, Harokopio University, Athens, Greece.

Introduction: The purpose of this study was to examine and compare preschoolers' physical activity (PA) patterns, across six European countries (Belgium, Bulgaria, Germany, Greece, Poland and Spain), participating in the Toybox-study.

Methods: A sample of 3,578 preschoolers (mean age: 4.8 (±0.42); 52.3% boys) was included. Step counts with two valid weekdays and two valid weekend days were used to describe preschoolers' PA-patterns. Multilevel analyses were performed to take clustering of measurements into account.

Results: This study indicates that PA-patterns during weekdays show a high variability of step counts. Different peaks and troughs in step counts are observed and the PA-patterns differ between countries. However, in all countries, expect for Germany, the PA-patterns clearly mirror the daily schedule in preschools. In general, low PA step counts can be observed especially during rest periods, classroom activities, lunch breaks but also during after-school-hours. In Germany less variability in preschoolers PA-patterns can be observed. On weekend days, PA-patterns across the different countries showed comparable PA-patterns, with less variability compared to the weekdays. In all countries the lowest step counts can be observed in the afternoon.

Conclusion: Preschool elements (recess, classroom activities, sleep periods) across the countries are clearly reflecting the step count patterns during weekdays. In Germany, preschools can independently choose their own daily schedule, which results in a less clear pattern. In general, it can be recommended to focus especially on classroom activities and on after-school-hours to improve preschoolers' PA-levels. PA-patterns during weekend days show comparable patterns, however the time of the PA peaks and troughs differ between countries. Therefore, we recommend to develop comparable interventions to promote PA in preschoolers during weekdays and weekend days, but to make local adaptations.

Nutritional ketosis as an additional stimulus for post-exercise muscle protein synthesis

Chiel Poffé[1]*, Tijs Vandoorne[1*], Stefan De Smet[1], Monique Ramaekers[1], Ruud Van Thienen[1], Katrien De Bock[1,2], Kieran Clarke[3], Peter Hespel[1]

[1] *Exercise Physiology Research Group, Department of Kinesiology, KU Leuven, Belgium*

[2] *Department of Health Sciences and Technology, Laboratory of Exercise and Health, Swiss Federal Institute of Technology (ETH) Zurich, Switzerland*

[3] *Department of Physiology, Anatomy and Genetics, University of Oxford, UK*

*, These authors contributed equally to this work

Introduction. Muscle mass is tightly regulated by the dynamic balance between muscle protein synthesis and degradation. Although exercise is the primary stimulus to enhance protein synthesis, the magnitude of this effect is modulated by nutritional factors, primarily protein intake. Previous research has suggested that another nutritional compound, i.e. ketone bodies, might be an additional stimulus to muscle anabolism (1). However, traditional techniques to induce a physiological ketosis failed to achieve these anabolic effects because they require reduced protein and carbohydrate intake. Recently, an oral ketone ester was synthetized, which enabled to increase serum ketone body levels, without the necessity of dietary restriction. This ester has been shown to increase exercise performance (2), but whether it can also promote post-exercise protein synthesis is unknown. **Methods.** Eight physically active males participated in a double-blind placebo-controlled crossover study. Subjects performed strenuous one-leg exercise to deplete muscle glycogen, followed by a 5h controlled recovery period during which they ingested carbohydrates and proteins together with a ketone ester (KE) or an isocaloric placebo (PL). **Results.** Ingestion of the KE resulted in elevated mTORC1 activation as evidenced by the higher phosphorylation of its main downstream targets S6K1 and 4E-BP1. This coincided with suppression of post-exercise AMPK phosphorylation. Additional *in vitro* experiments revealed that enhanced mTORC1 signalling with KE was accompanied by increased protein synthesis rate. **Conclusions.** Our results indicate that KE supplementation results in an additional post-exercise protein synthesis response compared to carbohydrates and protein intake alone. This data suggests that KE intake may be further considered as a potential strategy to stimulate training-induced muscular repair and remodelling.

(1) Nair KS, Welle SL, Halliday D, Campbell RG. Effect of b-hydroxybutyrate on whole-body leucine kinetics and fractional mixed skeletal muscle protein synthesis in humans. *J Clin Invest* 82(1): 198-205, 1988.

(2) Cox PJ, Kirk T, Ashmore T, et al. Nutritional ketosis alters fuel preference and thereby endurance performance in athletes. *Cell Metab* 24(2): 256-268, 2016.

Differential DNA methylation in relation to physical (in)activity

Caspers Maarten[1], Charlier Ruben[1], Knaeps Sara[1], Mertens Evelien[2], Lambrechts Diether[3], Lefevre Johan[1], De Bock Katrien[4], Thomis Martine[1]

[1]: Faculty of Kinesiology and Rehabilitation Sciences, KU Leuven (Leuven, Belgium); [2]: Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel (Brussels, Belgium); [3]: Laboratory of Translational Genetics (Vesalius Research Center), KU Leuven (Leuven, Belgium); [4]: Department of Health Sciences and Technology, ETH Zürich (Zürich, Switzerland)

Epigenetic mechanisms are dynamic throughout the human lifespan. As gene expression is regulated by the degree of DNA methylation at the promoter region and DNA methylation itself is influenced by several external factors, it is interesting to take lifestyle measures into account when studying DNA methylation and its effect on a specific trait or disease. The aim of this study is to detect differentially methylated CpG sites in relation to physical activity (PA) and sedentary behavior (SB). For 68 healthy Flemish men (55-58 years old), data regarding physical (in)activity were obtained using a SenseWear Pro 3 Armband during one week (1). The intensity of PA was expressed by the ratio of work metabolic rate to standard resting metabolic rate (MET). As a result, a distinction could be made between time spent on vigorous PA (>6 METs), moderate PA (3-6 METs), light PA (1.5-3 METs) and SB (<1.5 METs) (2). Furthermore, also the average PA intensity was calculated. DNA of the subjects was extracted from white blood cells and methylation content at over 485,000 CpG sites was determined using the Illumina Infinium HumanMethylation450 BeadChip. Linear regression analyses between the different physical (in)activity measures and the site-specific methylation content are performed to detect CpG sites associated with physical (in)activity. We hypothesize that many of the CpG sites associated with physical (in)activity are located in genes related to metabolic health. Furthermore, we also expect to find different sets of associated CpG sites when focusing on the four different PA intensity levels. Preliminary results indicate that the average PA intensity can explain 1.38% of the genome-wide variation in methylation content. The corresponding regression analysis detected 15,730 associated CpG sites (p=0.05), which are located in genes that cover in total more than 50% of the genes involved in the insulin secretion and adipocyte lipolysis pathways. However, no significant associations were found after FDR correction.

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Muscle physiological adaptations to voluntary running in cancer cachexia

Charlotte Hiroux, Chiel Poffé, Tijs Vandoorne, Monique Ramaekers, Katrien Koppo, Stefan De Smet, Peter Hespel, Emanuele Berardi

Exercise Physiology Research Group, Department of Kinesiology, KU Leuven, Belgium

Introduction. Cancer cachexia is a chronic degenerative syndrome characterized by involuntary loss of body weight and skeletal muscle mass. The progressive muscle wasting results in impaired muscle function, fatigue and eventually decreased quality of life. Currently, no effective treatment exists. Exercise has been proposed as a promising intervention strategy to treat the cancer-related muscle wasting. However, a complete picture of muscle physiological modulations upon physical activity in both healthy and cachectic conditions is still missing.

Methods. To investigate the effect of exercise, i.e. voluntary wheel running, on muscle plasticity in healthy and cachectic conditions, Balb/c mice were randomly divided in four experimental conditions: 1) healthy control mice at rest (Ctr Rest), healthy control mice performing wheel running (Ctr WR), C26 tumor-bearing mice at rest (C26 Rest) and C26 tumor-bearing mice performing wheel running (C26 WR). In tumor-bearing mice, $5x10^5$ C26 cells were injected subcutaneously in the back. All mice were sacrificed after 18 days. Analysis of MHC expression, distribution of oxidative and glycolytic fibers, vascularization and underlying molecular mediators were performed.

Results. Sedentary C26 tumor-bearing mice show a significant loss of body weight and muscle mass compared to the healthy controls while wheel running partially counteracts the muscle wasting in tumor-bearing mice. In gastrocnemius muscle, both exercise and cachexia conditions induce a shift from type IIb to type IIa fibers and stimulate the oxidative activity. Muscle adaptations to cancer cachexia include an increased capillary density with an additive effect mediated by physical activity. Moreover, at the molecular level, analyses reveal a pivotal role of both HIF2a and PGC1a activity in muscle fiber-type program and the adaptive response to physical activity in cancer cachexia.

Conclusion. Overall, our results show that voluntary running and cancer cachexia stimulate the fast-twitch oxidative phenotype and muscle oxidative activity. These insights will be useful to develop and optimize exercise intervention strategies to treat cancer-related muscle wasting.

The impact of an 8-week apnea training period on splenic volume and blood values.

Janne Bouten[1], Kevin Caen[1], Peter Van Eenoo[2], Leen Lootens[2], Filip Lefevere[1], Jan G. Bourgois[1], Wim Derave[1], Jan Boone[1]

[1] Department of Movement and Sports Sciences, Ghent Universit, Ghent, Belgium

[2] Doping Control Laboratory, Ghent University, Zwijnaarde, Belgium

Purpose. Apnea training has recently been proposed as a cheap and simple method to stimulate erythropoietin (EPO) production and increase hemoglobin concentration ([Hb]) and hematocrit (Hct). Therefore, it appears to be a promising method to improve oxygen transport capacity. This study aimed to investigate both acute and chronic effects of apnea on splenic volume and blood values through an 8-week intervention period of daily apnea training.

Methods. Thirteen subjects daily performed a series of five apneas. The first four were executed at 80% of their maximum as measured in the laboratory, the last one was maximal. Training apneic times were adjusted after four weeks of training. Before, halfway through and after the training period, the subjects performed five maximal breath-holds at the laboratory. Apneic time was recorded and splenic volume was measured at baseline and after the first and fourth apnea attempt. Venous blood samples were drawn before, immediately after, as well as 5, 10 and 20 minutes after the last apnea. All samples were analysed for [Hb], Hct and reticulocyte count (RET%).

Results. Splenic contraction in response to acute apnea was observed in all tests with volume reductions ranging between 45.0% and 59.0%. An acute increase immediately after the last apnea in [Hb] (+2.6%; $p<0.05$) was found before training. Acute increases in Hct were observed after four (+1.8%; $p<0.05$) and eight (+2.2%; $p<0.05$) weeks of training. After training, no larger splenic contraction nor enhanced acute increases in [Hb] and Hct were demonstrated. Chronic effects of apnea training included increased baseline splenic volume (+15.0%; $p<0.05$) and baseline [Hb] (+2.6%; 0.05), while Hct and RET% remained unchanged.

Conclusion. Our results strongly suggest an apnea-specific training effect, as it was the first study to detect that post-training baseline levels for splenic volume and [Hb] had been increased. However, the acute responses were not positively affected by apnea training.

Reference. Lemaître F, Joulia F, Chollet D (2010) Apnea: a new training method in sport? Med Hypotheses 74:413-415

Deelnemers Gaston Beunen Posterpresentatie

Alle jonge onderzoekers, inclusief Masterstudenten, die hun doctoraat nog niet verdedigd hebben kan deelnemen aan deze presentatiewedstrijd. De kandidaten krijgen 2 min tijd om hun werk te presenteren waarna er gedurende 3 min vragen kunnen gesteld worden door de jury. Tijdens de lunchpauze zal de jury elke deelnemende poster aandoen. De winnaar van deze wedstrijd krijgt een prijs van 150 euro, terwijl de als 2e en 3e gerangschikten geproclameerd worden.

Dit jaar zijn de volgende deelnemers geselecteerd:

- Jan Stautemas (UGent)
- Tom Walraeve (UGent)
- Timia Van Soom (UAntwerpen)
- Youri Geurkink (UGent)
- Benjamin Vermeulen (VUB)
- Celien Van Der Mispel (UGent)
- Justien Cornelis (UAntwerpen)
- Louise Poppe (UGent)
- Nele Huys (UGent)
- Lisa Pauwels (KULeuven)
- Yanni Verhavert (VUB)/Anne-Sophie Dockier de Donseel (VUB)
- Anass Arrogi (KULeuven)
- Celine Maes (KULeuven)
- Silke De Waelle (UGent)
- Pieter Van den Berghe (UGent)
- Julie Latomme (UGent)
- Caydie Van Brabant (UGent)
- Verbruggen Marlies
- Torfs Marlies

The effect of acute exercise and serum carnosinase on circulating and muscle histidine-containing dipeptides in mice

Stautemas J[1], Everaert I[1], Baba S[2], Hauske S[3], Yard B[3], Regazzoni L[4], Aldini G[4], Derave W[1]

[1]Dep Movement and Sports Sciences, Ghent University, [2]University of Louisville

[3]University of Heidelberg [4]University of Milan

The histidine-containing dipeptides (HCD), carnosine and anserine, are mainly stored in skeletal muscle but they may fulfil several functions (e.g. carbonyl quencher, antioxidant) in other organs in our body(1). Interestingly, Nagai et al. (2003)(2) reported enhanced circulating carnosine levels in mice that have access to a running wheel compared to resting mice. This myokine-like release from the muscles into the circulation could aid to partially explain the preventive and curative effect of exercise on metabolic diseases. However, caution is warranted as rodents lack the highly active HCD-degrading enzyme, serum carnosinase 1 (CN1), which is present in the human circulation. The objective of this study was to more profoundly investigate the HCD metabolism during acute exercise in healthy mice and in obese mice with or without expression of the human CN1 enzyme. After an acclimatization period, wild type (BTBR wt/wt) and obese (BTBR ob/ob) mice with or without CN1 transgenic expression were subjected to treadmill running for 1 hour at 15 and 10m/min, resp. Plasma and muscles were immediately collected following exercise and analysed by LC/MS2 for HCD levels.
First, plasma HCD levels tended to be significantly higher (+49%, $p < 0.05$) only in exercising compared to resting obese mice. This increase in HCD levels was predominantly evoked by carnosine (+75%, $p < 0.05$) and less by anserine (+35%, $p > 0.05$). Second, 1h running had no effect on soleus and gastrocnemius muscle HCD content. CN1, that is located in the serum, was able to markedly decrease soleus (-95%, $p <0.05$) and gastrocnemius (-51%, $p < 0.05$) muscle HCD content in resting obese mice. On top of that, it eliminated most circulating HCD, thereby preventing a possible exercise-induced release in the CN1 transgenic obese mice. In order to preliminary test if these results are translatable to humans, urine collection was performed before and after a high intensity cycling bout in 12 participants. Interestingly, the urinary excretion of carnosine was increased following cycling (+154%, $p<0.05$).
In summary, circulating carnosine levels were enhanced following an acute exercise bout in obese mice. The presence of CN1 resulted in a depletion of HCD levels, both in the circulation and in muscle, providing an interesting model to study the causative role of HCD in the preventive and curative effect of chronic exercise on different metabolic diseases.

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(2) Nagai K et al. Exp Biol Med 2003; 228: 1138–1145.

The interrelationship between critical power, RCP and breakpoints in muscular and cerebral oxygenation: impact of an interval training program.

Tom Walraeve[1], Kevin Caen[1], Kobe Vermeire[1], Jan Bourgois[1], Jan Boone[1]

Department of Movement and Sports Sciences, UGent

Purpose: We investigated whether critical power (CP), respiratory compensation point (RCP) and breakpoints in muscle (mHHb) and cerebral (cO_2Hb) oxygenation during incremental ramp exercise might be mechanistically linked by studying their interrelationship pre and post cycling interval training.

Methods: Ten male students (21.8 ± 1.2 years, 52.1 ± 3.7 ml/min/kg) performed an incremental ramp cycle test (25 W·min−1) to exhaustion, both before and after a 6 week cycling interval training program. During the training program, subjects trained 3x/week on a cycling ergometer and performed 6 bouts of 4 min at their CP (269 ± 40 W), interspersed with with 3 min rest at P_{GET} (182 ± 23 W). Breath-by-breath gas exchange was recorded, and muscle and cerebral oxygenation were measured using near-infrared spectroscopy.

Results: All parameters, except CP (8 ± 251 $ml.min^{-1}$), showed an equivalent and significant increase in VO2 (382 ± 57 $ml.min^{-1}$) after the training program ($p < 005$). All thresholds occurred within a range of 85-95 $\%VO_{2Peak}$. Pre training CP (3614 ± 317 $ml.min^{-1}$), RCP (3551 ± 295 $ml.min^{-1}$), [mHHb] (3709 ± 332 $ml.min^{-1}$) and [cO_2Hb] (3422 ± 375 $ml.min^{-1}$) occurred at a similar VO_2 output, but after the training program this was only the case for RCP (3854 ± 350 $ml.min^{-1}$) and [cO_2Hb] (3868 ± 337 $ml.min^{-1}$). Multiple correlations between the thresholds have been determined pre and post training. However, the extent to which these thresholds change are not correlated, except for two ($p < 0,05$).

Conclusion: Although the thresholds pre and post training show a tendency to be interrelated, the extent to which they increase after the training program were not correlated. Despite the physiological arguments which suggest a mechanistic link between these thresholds, the results of this study strongly question there equivalence.

The effect of cardiac rehabilitation on survival in coronary artery disease patients with and without chronotropic incompetence.

Timia Van Soom[1]; Justien Cornelis[1]; Kurt Wuyts[2]; Ella Roelant[3]; Nadine Possemiers[2]; Paul Beckers[1,2]

[1]University of Antwerp, Department of Rehabilitation Sciences and Physiotherapy; [2]Antwerp University Hospital, Department of Cardiac Rehabilitation; [3]Antwerp University Hospital, Department of Scientific Coordination and Biostatistics.

The inability to reach 60% of the maximal predicted heart rate reserve (HRR) during a maximal cardiopulmonary exercise test (CPET) while on beta-blocker therapy is a prognostic marker for worsened prognosis especially in patients with heart failure (HF). The prognostic significance of chronotropic incompetence (CI) in patients with coronary artery disease (CAD) is still unclear. Patients with CI benefit from cardiac rehabilitation as aerobic endurance training (AET) tend to increase peak heart rate (HR) and lower rest HR. The purpose was to compare the effect of AET on survival in CAD patients with CI (CAD+CI) and without CI (CAD-CI). The database was retrospectively searched and included CAD patients on beta-blocker therapy performed a CPET at the start and the end of the program. Chronotropic incompetence was defined as HRR<60% during maximal CPET (RER>1,15), using the formula ((HRpeak-HRrest)/(220-age)-HRrest))*100%. Patients trained at a target 90% of the HR at respiratory compensation point (38 sessions,3x/wk,60') at the outpatient center. Last-living registration was recorded, mortality rate was estimated and survival analyses carried out. Significance was set on $p<0.05$. The CAD population consisted of 134 patients (114m/20f)(age:58.8±10.3y; EF:58.2±9.5%). There were 60 patients (54m/6f) in CAD-CI (age:56,7±10,5y; EF:57.1±8.1%). CAD+CI contained 74 patients (60m/14f)(age:60.5±9.8y; EF:59.1±10.4%). Both groups significantly improved HRrest, HRpeak, HRRecovery-1, HRR, half-time of peak VO_2, peak VO_2, OUES and CI after AET. The VE/VCO_2 slope improved only significantly in CAD+CI population. Peak VO_2 increased with 25% in CAD+CI versus 20% in CAD-CI after AET. Mean follow-up was 2725±1140 days. The 5-year mortality rate was 2.24%. Uni- and multivariable survival analyses revealed solely peak VO_2 as significant predictor of survival in CAD. In CAD+CI, AET appeared to have more effect on the ventilator efficiency. Improvements in CPET parameters were present in both groups. In CAD, CI improved but only peakVO_2 was a predictor of survival after optimal cardiac rehabilitation. Adherence to training afterwards could be crucial in the management of CAD.

Factors influencing the session Rate of Perceived Exertion in professional soccer players.

Geurkink Youri, Boone Jan, Lievens Maarten

Department of Movement and Sport Sciences, Ghent University, Belgium

Purpose: Controlling and monitoring the internal training load (ITL) is important in order to obtain the appropriate training stimulus. The ITL is greatly influenced by the external training load (ETL), imposed on the players (1). The aim of this research was to identify the ETL factors influencing the session Rate of Perceived Exertion (sRPE) and to predict the sRPE based on the ETL. **Methods**: 243 sRPE-scores from 30 players during 16 different training sessions were coupled to the ETL. Goalkeepers were excluded from the sample. As a measure of ITL, sRPE (CR10-scale) was assessed within 30 minutes after the training session. ETL was obtained through Polar heart rate monitors and included distance, time, overall average speed, distance in 5 different speed zones, time in 5 different heart rate zones and total number of sprints. To identify the factors influencing the sRPE and predict the sRPE, multilayer perceptron (MLP) and discriminant analysis (DA) were used. **(Preliminary) results**: Both MLP and DA showed that distance in speed zone 4 (15,00 – 18,99 km/h), overall average speed and time in heart rate zone 90-100% were the greatest factors influencing sRPE. Using the MLP, 24,8% ± 5,78 of the sRPE-scores were correctly classified, with a mean square distance (MSD) of 1,55 ± 0,62. When using a less strict approach, classifying a score 1 point higher or lower than the observed score as correct, MLP classified 66,4% ± 8,32 of the sRPE-scores correctly, with a MSD of 0,81 ± 0,51. DA classified 27,6% of the sRPE correctly, with a MSD of 2,56 and 68,3% of sRPE-scores were correctly classified, with a MSD of 0,92, when using the less strict approach. **(Preliminary) Conclusion**: The classifying results were quite similar between MLP and DA, with DA slightly outperforming MLP. However, the MSD-scores of MLP were lower, which suggests that MLP predicts the sRPE closer to observed sRPE than DA. In order to control the ITL, coaches could focus on manipulating the distance spent in speed zone 4, overall average speed and time spent in heart rate zone 90-100%. Although MLP performs better with a larger dataset, 243 datalines were enough to predict 2 out of 3 sRPE scores within a 1 point range below and above the observed sRPE. However, to obtain better results, future research should include more datalines. Adding more variables, especially variables involving individual characteristics, could also be useful, since sRPE is influenced by not only the ETL, but also the players' individual characteristics.

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Event specific body characteristics of world cup competing alpine skiers in relation to international rankings.

B. Vermeulen[1], R. Clijsen[1,2], R. Fässler[2], J. Taeymans[1,3], E. D'Hondt[1] and D. Aerenhouts[1]

[1]*Department of Movement and Sports Sciences, Vrije Universiteit Brussel, Belgium*

[2]*University College Physiotherapy Thim van der Laan, Landquart, Switzerland*

[3]*University of Bern, Switzerland*

Introduction: Training interventions and ferritin values elicit the importance of resistance training and aerobic training but do not allow to differentiate between alpine ski disciplines. Additional somatotyping and tissue ratio measurements may clarify performance indicators and be helpful to develop adequate training and nutritional strategies for each alpine ski event. Subsequently, talent identification may be facilitated when these strategies are known. **Methods:** A cross-sectional sample of 63 world cup competing alpine skiers were allocated into two event groups based on their international ski rankings in either Slalom (SL) or Downhill (DH). Several two-way (2*2) MANOVAs were used to compare somatotype, age, height, weight, Body Mass Index and sum of skinfolds between (1) gender, (2) event and (3) gender*event. Forward stepwise discriminant analysis selected the most discriminating somatotype component between (1) gender and (2) event. Bivariate Pearson correlations between registered variables and rankings were examined for each gender. **Results:** For both genders, DH specialists were found to be older and heavier ($p<0.001$) with a smaller ectomorph component ($p=0.010$) and more relative fat mass ($p=0.005$) than SL specialists. In addition, age and weight were associated with higher DH rankings. Endomorphy was associated with higher rankings ($p<0.010$) in female elite DH specialists but not in male DH specialists. **Conclusions:** Slalom skiers tend to be slenderer than DH skiers so that they may be more agile in SL events. Irrespective of gender, heavier bodies and certain amounts of relative fat mass are associated with higher rankings in DH events, especially within the female sample.

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User and website characteristics related to attrition in a self-regulation-based eHealth intervention to promote a healthy lifestyle

C. Van der Mispel[1,2], L. Poppe[1,2], M. Verloigne[2], I. De Bourdeaudhuij[2], G. Crombez[1]

[1] Faculty of Psychology and Educational Sciences, Ghent University, Belgium

[2] Faculty of Medicine and Health Sciences, Ghent University, Belgium

Purpose: EHealth interventions can reach large populations and are effective in increasing physical activity (PA) and fruit and vegetable intake (FI, VI) (1). Nevertheless, the effects of eHealth interventions are overshadowed by high attrition rates (2). This study investigates the pattern of attrition in 'MyPlan 1.0', a web-based intervention to increase PA , FI and VI, that consists of three modules. The first aim is to describe attrition rates according to the components in the baseline module. A second aim is to investigate user characteristics as predictors for baseline completion, returning to a follow-up module and intervention completion.

Methods: The baseline module of the intervention was divided into eight meaningful blocks, according to different self-regulation techniques and attrition was described per block. To identify predictors of completion, logistic regression analyses were conducted, with gender, socio-economic status, age and body mass index as possible predictors.

Results: Although attrition occurred during all blocks, some critical points in the intervention could be identified. The largest amount of attrition occurred when people had to choose to make their own action plan. There were no significant predictors for baseline completion. However, older adults were significantly more likely to return to the follow-up and older participants and women were more likely to complete the intervention.

Conclusions: Results imply that future interventions should focus first on motivating users for behaviour change, before guiding them through action planning. There is also a need to adapt eHealth interventions in order to motivate younger users and men to complete them.

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Comparing exercise training modalities in heart failure

Justien Cornelis[1], Paul Beckers[2,3], Jan Taeymans[3,4], Christiaan Vrints[2,3], Dirk Vissers[1]

[1]University of Antwerp (Faculty of Medicine and Health Sciences), Department of Rehabilitation Sciences and Physiotherapy, Wilrijk, Belgium.

[2]Antwerp University Hospital (Department of Cardiology), Edegem, Belgium.

[3]University of Antwerp (Faculty of Medicine and Health Sciences), Department of Medicine, Wilrijk, Belgium.

[4]Vrije Universiteit Brussel (Faculty of Physical Education and Physical Therapy), Elsene, Belgium.

[5]Bern University of Applied Sciences (Health), Bern, Switzerland.

Exercise training (ET) is suggested to improve exercise capacity, prognosis, quality of life (QOL) and functional modifications of the heart in patients with heart failure (HF). However, it is not clear which modality is best. In order to assess the effectiveness of different ET modalities on prognostic cardiopulmonary exercise test (CPET) parameters, QOL and left ventricular remodeling, a systematic review and meta-analysis was performed. Randomized clinical trials (RCTs) were selected in three databases. The primary outcome data were peak oxygen uptake, ventilation over carbon dioxide slope, oxygen uptake efficiency slope, exercise oscillatory ventilation, rest and peak pulmonary end-tidal CO2. Secondary variables were QOL, left ventricular ejection fraction (LVEF) and left ventricular end-diastolic diameter (LVEDD). The extracted data were pooled using random effects meta-analysis. Twenty RCTs (n=811) met the a-priori stated inclusion criteria. Studies were categorized into four different groups: “interval training (IT1) versus combined interval training and strength (IT1S)” (n=156), “continuous training (CT1) versus combined continuous training and strength (CT1S)” (n=130), “IT2 versus CT2” (n=501) and “CT3 versus strength (S3)” (n=24). No significant random effects of exercise modality were revealed assessing the CPET parameters.There was a significant improvement in QOL applying CT1S ($P<0.001$). Comparing IT2 with CT2, LVEDD and LVEF were significantly improved favoring IT2 ($P<0.001$). There is some evidence to support that interval training is more effective to improve LVEF and LVEDD. The fact that patients with HF are actively involved in any kind of ET program seems sufficient to improve the prognosis, QOL and anatomic function.

Understanding users' perceptions regarding eHealth interventions: An in-depth analysis using think aloud interviews.

Louise Poppe[1,2], Celien Van der Mispel[1,2] , Maïté Verloigne[1], Geert Crombez[2], Ilse De Bourdeaudhuij[1]

[1]Faculty of Medicine and Health Sciences, Ghent University, Belgium

[2]Faculty of Psychology and Educational Sciences, Ghent University, Belgium

Purpose: Although eHealth interventions have shown to be effective in changing health behaviours [1], they are often challenged by high attrition rates [2].Therefore it is recommended to make in-depth investigations about how users experience eHealth interventions in order to create interventions that are more adapted to their end-users [3]. The presented study uses think aloud interviews to gain deeper insights in users' perceptions and experiences while going through an online intervention.

Methods: Think Aloud interviews were taken while participants went through "MyPlan 1.0", which is a self-regulation-based eHealth intervention designed to increase physical activity (PA) or fruit or vegetable intake (FVI) in adults. Forty individuals participated in the study. The interviews were transcribed verbatim and inductive thematic analysis was applied.

Results: Many participants stated that they became more aware of their health behaviours, but that going through the website was too time-consuming. Furthermore, many users expressed that they didn't want to monitor their PA or FVI since they perceived it as useless. However, users often stated that a mobile application would help remind them about their goals and might make it easier to monitor their health behaviours.

Conclusions: Think aloud interviews can offer in-depth information about users' perceptions and preferences regarding eHealth and can guide adaptations to the intervention.

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School gardens: a qualitative study on current practices in Flanders and recommendations for future projects

Nele Huys[1], Katrien De Cocker[1], Ilse De Bourdeaudhui[1]j, Marleen Roesbeke, Greet Cardon[1], Sara De Lepeleere[1]

[1] Department of Movement and Sports Sciences, GHENT University (Ghent, Belgium)

Background: The vegetable consumption of primary schoolchildren in Flanders (Belgium) is insufficient. A school garden project is an experiential learning approach which can improve this consumption. However, there is a lack of research on teachers' and children's perceptions towards a school garden. This qualitative study examines the implementation of a school garden and the perceptions of teachers/responsible persons and children towards the implementation of their school garden.

Methods: Twelve interviews with 14 teachers/responsible persons and five focus groups with 38 children from fifth or sixth grade (10-12 years old), were conducted between February and March 2015 in four primary schools in Ghent (Flanders, Belgium). The interviews and focus groups were analyzed in NVivo, using thematic analysis.

Results: School gardens seemed not to be initiated to improve children's vegetable consumption, but to involve children in nature. Although teachers and children perceived positive effects on knowledge of vegetables and attitudes towards eating vegetables, they did not perceive effects on vegetable consumption. The organization of the school garden was similar in the four schools and overall, teachers/responsible persons and children were very positive about having a garden at school. However, teachers/responsible persons experienced some problems in implementing the school garden. It was important to have external help at startup and to have someone internal taking responsibility for the school garden. Furthermore, all schools experienced difficulties with the maintenance of the garden during summer holidays and the integration of the school garden in the core curriculum. Another problem was that the school gardens were too small to offer enough possibilities for all children to work in the garden and to use the harvest for feeding all children.

Conclusions: While school gardens can be initiated to involve children in nature, it is important to add information on the possible positive effects on eating behavior of children. Furthermore, offering programs to diminish the informational and organizational burden for teachers is needed. Finally, it may be important to involve parents in school gardening, since they play a major role in children's health behavior.

Struggle today, benefit tomorrow – the importance of adding challenge when learning motor skills

Lisa Pauwels[1], Celine Maes[1], Sima Chalavi[1] and Stephan P. Swinnen[1]

[1]Movement Control and Neuroplasticity Research Group, Biomedical Sciences Group, Department of Kinesiology, KU Leuven, Leuven, Belgium

Practice is considered to be "the key factor" responsible for the improvement in motor skills. Hence, it is crucial to know which types of training lead to the best possible outcome. Most of us think repetition is the ticket – *endless drills until perfection*. To date, this is still the golden rule in various disciplines, applied in the classroom as well as on the sports field. But is repetition *the ultimate and only way to achieve our goal*? That is what researchers have been trying to find out during the past decades. In this respect, it has been established that making a training session more difficult by manipulating practice structure, i.e. introducing a randomized rather than a blocked (repetitive) practice schedule, is beneficial for motor learning. As such, random practice leads to better retention performance although performance during training is worse as compared to blocked practice (Shea and Morgan, 1979). This denotes a distinction between performance and learning and is often referred to as the paradoxical opposing effects of contextual interference (CI) during practice and retention. Although the CI effect is a robust phenomenon in simple task learning, it is much less explored in more complex tasks that require extra cognitive effort. Hence, the current study addressed whether principles derived from simple task studies can be extended to complex skill learning. Participants practiced three bimanual task variants across three practice days following either a blocked or random practice schedule. One week later, a retention test was administered. Typical CI effects were observed in which random as opposed to blocked practice was detrimental for performance during the acquisition phase. However, with respect to retention performance, the effect was reversed and the random group outperformed the blocked practice group. Moreover, following random practice, better skill persistence (i.e. retaining performance from end of acquisition to retention) over a one week time interval was observed. To conclude, training-induced skill learning is shown to be driven by an optimal level of *desirable difficulty*. These findings contribute to our understanding of learning, consolidation and memory of complex motor skills, which is important for the optimization of training protocols in various disciplines and rehabilitation settings.

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Changes in first year university students' diet quality: is there a difference according to gender and residency?

Donckier de Donceel A.[1], Verhavert Y.*[1], Deliens T.[1], Mullie P.[1,2], Deforche B.[1,3], Clarys P.[1]
*Equal contribution as first author

[1]Department of Movement and Sport Sciences, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium

[2]International Prevention Research Institute (iPRI), 15 chemin du Saquin, 69130 Ecully (Lyon),France

[3]Department of Public Health, Ghent University, De Pintelaan 185, 9000 Ghent, Belgium

Background/objective: Although the first semester at university is a critical period for changes in dietary patterns, to date, there is no evidence on changes in university students' diet quality. Since gender and residency were found to be related with dietary patterns, these should be taken into account as possible moderators of dietary changes. Therefore, the purpose of this study was to assess changes in first year university students' diet quality according to gender and/or residency during the first semester.

Subjects/Methods: In this prospective study, a self-report questionnaire was used to assess dietary intake (by means of a 150-item food frequency questionnaire (FFQ)) and characteristics of the participants at the beginning of the first semester (baseline) and the beginning of the second semester (follow-up) of the first academic year. After a drop out of 62.9%, 112 first year university students were included. Diet quality was assessed with the Healthy Eating Index (HEI).

Results: There was no change in diet quality over time (p=0.480), nor was this change dependent of gender (p=0.129), residency (p=0.587) or both gender and residency (p=0.631). For gender, there was a significant difference in diet quality, where females showed a better diet quality at both measuring points (p=0.041). Analyses of the HEI components only showed an increase in intake of empty calories among females (p=0.026).

Conclusion: No significant change in diet quality could be observed in any of the groups of university students across the first semester. Due to possible selection bias, results should be interpreted with caution.

Evaluation of stAPP: a smartphone-based intervention to interrupt and reduce prolonged sitting behavior in healthy adults

A.Arrogi[1], A. Bogaerts[2], J. Seghers[1], K. Devloo[1], V. Vanden Abeele[3], L. Geurts[3], J. Wauters[3], F. Boen[1]

[1] Department of Kinesiology, KU Leuven, Leuven, Belgium

[2] Faculty of Kinesiology and Rehabilitation Sciences, KU Leuven, Leuven, Belgium

[3] e-Media Lab, KU Leuven, Leuven, Belgium

Background: Prolonged and uninterrupted sitting, also known as sedentary behavior, has been linked to adverse health effects. However, the general population is often unaware of these health risks. Mobile phone technology offers great potential to increase awareness and to initiate behavior change.

Objective: This study examined the short-term effects of stAPP, a persuasive smartphone application (app), on prolonged sitting behavior.

Methods: Fifty-eight participants were randomly assigned to an intervention group (IG, n=31) or a control group (CG, n=27). After one week of baseline assessment, the IG received the stAPP app and used it during the following week. The stAPP app was designed by a multidisciplinary team and was based on a combination of four principles of major behavioral change techniques: 1) providing information on the health consequences of prolonged sitting (i.e., education); 2) alerting users with an alarm when sitting for too long (i.e., persuasion); 3) providing tailored feedback on sitting behavior by graphs and sedentarity scores (i.e., self-monitoring); 4) rewarding users by achievements (i.e., incentivisation).

CG participants were monitored during two weeks without receiving any of the mobile intervention elements. Sitting time, time accrued in prolonged sitting bouts (>30 minutes of accumulated sitting), as well as standing and stepping time were objectively assessed using ActivPAL^{TM} inclinometers.

Results: While no significant changes emerged in the CG in any of the sitting measures, total sitting time (-40.1 min/day; $p<.05$), number of prolonged sitting bouts (-2.3 bouts/day; $p<.001$) and average duration of prolonged sitting bouts (-13.0 min/day; $p<.01$) decreased significantly in the IG. ActivPAL^{TM} data pointed out that sitting time was replaced by standing time (+35.4 min/day; $p<.05$) and not by stepping time ($p>.05$).

Conclusion: The stAPP mobile application seems to be a promising intervention tool to interrupt and reduce prolonged sitting. It remains to be determined whether this persuasive app leads to long-term behavioral changes.

Challenge to promote change: the neural correlates of contextual interference during acquisition of coordination tasks – preliminary results

Celine Maes[1], Lisa Pauwels[1], Sima Chalavi[1] and Stephan P. Swinnen[1,2]

[1]KU Leuven, Movement Control and Neuroplasticity Research group, Department of Kinesiology, Group Biomedical Sciences, Leuven, Belgium

[2]KU Leuven, Leuven Research Institute for Neuroscience & Disease (LIND), Leuven, Belgium

In the past decades, a lot of research has been dedicated to the optimization of training paradigms in motor skill learning. The key question is how to compose a training schedule to guide the learner towards the best possible outcome. Although blocked practice (i.e. constant repetition of a task variant before moving on to the next) is conventional in different settings, it does not seem to be the best approach. As such, the variance in presentation order of different task variants, i.e. contextual interference (CI), is shown to be paramount for learning outcomes. Research has provided compelling evidence regarding the CI effect, i.e. the beneficial effect of a random compared to a blocked practice schedule on motor learning, despite detrimental effects on the acquisition phase. Although the CI effect is a robust phenomenon in simple task learning, its generalization to rather complex tasks is still debated. Furthermore, little is known about the neural correlates of the CI effect, which hampers knowledge about the underlying mechanism that gives rise to the CI effect. On these grounds, this study aimed to investigate the CI effect in a complex bimanual task on a behavioral and neuroimaging level by using functional magnetic resonance imaging (fMRI). To this end, 32 younger adults were randomly assigned to either a random or a blocked practice group. Each participant completed a baseline assessment followed by 3 days of training. Finally, a retention test was carried out 6 days afterwards. Whereas behavioral results were explored for all participants, preliminary neuroimaging data are presented for a subsample of 10 subjects. ***Behavioral results*** support the advantage of random practice on retention despite poorer performance during the acquisition phase compared to blocked practice. Investigating the ***neural correlates*** during the acquisition phase, the blocked practice group mainly relied on brain areas involved in basic bimanual coordination (sensorimotor areas, cerebellum and subcortical structures), whereas higher-order areas, such as the premotor cortex, were activated in random practice. During retention, the random group, demonstrated an additional activation of higher-order structures needed to retrieve memory and optimize the integration of sensory information (e.g. precuneus). These findings suggest that the benefit of random practice might arise from a more profound cognitive engagement, which is of great importance in the optimization of training schedules.

The influence of small and middle-sized participation events on sports participation

De Waelle S., Willem A.

Department of Movement and Sports Sciences, Ghent University

Problem statement. Recently, the potential of mass participation sporting events to leverage sports participation has been gaining attention. However, contrary to what might be expected, large and middle-sized mass participation events have little influence on sports participation. Therefore, this study attempts to determine whether small participation events could have a greater influence on sports participation than middle-sized events.

Background. Research showed that only a small amount of participants will increase their levels of exercise in anticipation of the event, and only a fraction of these participants will sustain these increased levels of exercise (Murphy & Bauman, 2007; Funk et al., 2011). However, little research has been conducted concerning small participation events, so their influence remains unclear.

Method. Motivation (BREQ-2), intentions (Stages Of Change), and hours of training were measured in participants of nine small and middle-sized events in Belgium: two cycling events and seven running events. Events with less than 10 000 participants were classified as small events, while events with 10 000 to 50 000 participants were classified as middle sized events.

Results. This study found several indications that small participation events could be more effective in generating sports participation than middle sized participation events. Firstly, this study found that participants of small participation events are more likely to participate again in the event next year. Secondly, they are also more likely to train for the event, and when they do, they put in significantly more training hours than the participants of middle sized events.

Discussion & Conclusion. Taking the above into account, this study strongly indicates that small participation events could lead to more sports participation, however, there is a strong need for more extensive and longitudinal research on this topic.

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Monitoring and analysis of training load and physical performance in elite soccer

Van den Berghe Pieter, Rud Derie, Jan Bourgois, Jan Boone

Department of Movement and Sport Sciences, Ghent University

BACKGROUND: High-level team sport athletes are exposed to high training loads (TL) [1]. Soccer can be considered as an intermittent high intensity activity where an optimal level of aerobic ($VO2_{max}$ > 60 ml/min/kg) and anaerobic fitness is required [2]. This study aims to examine internal TL, using session Rating of Perceived Exertion (sRPE) as proposed by Foster [3], and to evaluate physical performance parameters and its progression in elite soccer players in-season. **METHODS**: An app was developed to monitor TL [sRPE (0 - 10 scale) x session duration (min); AU] in a Belgian soccer team playing at the highest national level during 47 consecutive days. Coaching staff estimated the team's TL after each session. When preseason started and regular competition ended, 16 field players executed a sport-specific test battery including jump, sprint and maximal progressive exercise testing. **RESULTS**: Mean $TL_{session}$ was 223 ± 51 AU and 80 % of the training sessions appeared to happen at low intensity (< 3). Weekly TL differed between no game (777 ± 186 AU), 1 game (1270 ± 295 AU) and 2 games (562 ± 128 AU) a week ($p = 0.019$). Game load (752 ± 125 AU AU) was higher compared to session loading across training modalities (range, 160 - 621AU) ($p < 0.001$). Similar sRPE-scores were found at low, moderate and high training intensities between coaching staff and players ($p = 0.207$). The VO2max was 60 ± 3 ml/min/kg and decreased by 1.2 % during competition ($p = 0.045$). Sprints and counter movement jump tests did not change significantly ($p > 0.05$). **DISCUSSION**: Mean TL of a Belgian soccer team (223 AU) was in line with that of an English Premier League team (218 AU) [4]. Most training sessions were performed at low intensity, tending towards a polarized training model. Soccer coaches' prescribed and players' experienced sRPE scores may differ [5], but an expert coaching staff correctly evaluated the global training intensity perceived by the players. The $VO2_{max}$ as an important physical performance parameter coincided with the proposed threshold of 60 ml/min/kg for elite soccer players.

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Barriers and facilitators for healthy physical activity, sedentary behaviour and dietary habits in young European families at risk for type 2 diabetes: focus groups with teachers and local community workers

Julie Latomme[1], Vicky Van Stappen[1], Greet Cardon[1], Mina Lateva, Nevena Chakarova, Jaana Lindstrom, Odysseas Androutsos, Esther M. Gonzalez-Gil, Pilar De Miguel-Etayo, Anna Nanasi, Laszlo R. Kolozsvari, Yannis Manios, Marieke De Craemer[1]
on behalf of the Feel4Diabetes-study group.

[1] Department of Movement and Sports Sciences, GHENT University (Ghent, Belgium)

Objective. To gain insight into the barriers and facilitators for sufficient physical activity, limited sedentary time and healthy dietary habits that might be experienced by young European families at risk for developing type 2 diabetes. Focus groups with teachers and local community workers were conducted to gain more insight into these barriers and facilitators.

Methods. Twelve focus groups (six with teachers of primary schools and six with local community workers) were conducted across six European countries (Belgium, Bulgaria, Finland, Greece, Hungary and Spain). In total, 45 teachers and 41 local community workers participated in the focus groups. Barriers and facilitators for healthy physical activity, limited sedentary time and healthy dietary habits were mapped through semi-structured interview guides. Focus groups data were analyzed centrally using the qualitative data analysis software NVIVO.

Results. Across all countries, most of the barriers for sufficient physical activity reported by teachers and local community workers were situated on the individual level (e.g. lack of knowledge and motivation). Barriers for limiting sedentary time were mostly situated on the organizational level (e.g. indecent school policy, having a sedentary job) and barriers for healthy dietary behaviour were mostly situated on the interpersonal level (e.g. lack of dietary acculturation, having no positive role models). Facilitators for sufficient physical activity and healthy dietary behaviour were mostly situated on the organizational level (e.g. availability of low-cost physical activities and mandatory physical education classes, positive school policy for dietary behaviour). For sedentary time only one facilitator was mentioned, i.e. having a good role model (interpersonal level).

Conclusions. Teachers and local community workers reported some important barriers and facilitators to adopt a healthy lifestyle for young European families at risk for developing type 2 diabetes. These barriers and facilitators were situated on different levels (i.e. individual, interpersonal, organizational or community level), depending on the health behaviour. Interventions aiming to prevent type 2 diabetes should focus on reducing the identified barriers and on improving or providing the facilitators, taking into account the levels on which these barriers and facilitators are situated.

The effects of acute exercise on circulating R- and S-beta-aminoisobutyric acid

Van Brabant Caydie, Jan Stautemas, Wim Derave

Department of Movement and Sports Sciences, Ghent University

Purpose: beta-aminoisobutyric acid (BAIBA) is a recently discovered myokine consisting of 2 enantiomers, R- and S-BAIBA. BAIBA is of interest due to its negative correlation with cardiometabolic risk factors and its ability to induce browning of white adipose tissue in humans. It is already known that BAIBA plasma concentrations are systematically influenced by single nucleotide polymorphisms (SNP) of the AGXT2 enzyme. Furthermore a recent study discovered plasma levels of BAIBA to be increased (+17 %) due to chronic endurance training. However nothing is known about the acute effects of exercise, therefore the main aim of our study will be to elucidate the impact of a one hour exercise bout on circulating R- and S-BAIBA concentrations.

Methods: five subjects performed a one hour cycling exercise at 40 % of their maximal power. Blood samples were taken at arrival, 5 minutes before, and at 10, 30, 60, 65 and 70 minutes after the start of the cycling exercise. Genotyping of the AGXT2 SNP rs37369 was performed and R- and S-BAIBA concentrations were determined.

Results: Female (R: 1,28 ± 0,2724 µmol/L, S: 0,0095 ± 0,0058 µmol/L) seemed to contain lower fasted R- and S-BAIBA concentrations in plasma than male subjects (R: 2,0333 ± 0,48533 µmol/L, S: 0,0355 ± 0,00794 µmol/L). Besides, CC genotypes (R: 1,6533 ± 0,6872, S: 0,0193 ± 0,0176 µmol/L) appeared to encounter lower fasted R- and S-BAIBA concentrations in plasma than CT genotypes (R: 2,18 ± 0,5515 µmol/L, S: 0,0290 ± 0,0042 µmol/L). However, we were unable to statistically confirm these presumptions due to inadequate power. Because of the cycling exercise, S-BAIBA concentrations were increased (+46 %)($p = 0,008$), and tended to be increased (+25 %)($p = 0,051$) respectively immediately and five minutes after completion of exercise, compared to rest values. R-BAIBA was not affected.

Conclusion: This preliminary study suggests R-BAIBA to be the predominant enantiomer in plasma. It remains unclear to what extent the observed differences between subjects are induced by gender or genotype because we were unable to make a distinction due to inadequate power. However, the one hour exercise bout seemed to increase the concentration of S-BAIBA in plasma, R-BAIBA appeared to remain unaltered. The exercise induced alterations appeared to be unaffected by gender or genotype.

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Impact of continuous feedback of lumbosacral position during sitting on spine motor control: the Profiler study.

Verbruggen M.[1], Ceulemans L.[1], Jong K.[1], Jochems P.[1], Gonzalez S.M.[2], Daenen L.[3,1], Hermans V.[3,4], Vaes P.[1]

[1]Vrije Universiteit Brussel, Physiotherapy, Brussels, Belgium, [2]University of Jaén, Physiotherapy, Spain, [3]Knowledge, Information and Research Center, IDEWE Louvain, Belgium, [4]Vrije Universiteit Brussel, Mental Health and Wellbeing Research Group, Brussels, Belgium

Introduction: Prolonged sitting is one of the top five risk factors for low back pain according to physiotherapists[1]. Prolonged sitting can often lead to a slump posture. Literature showed that slump sitting for 5 minutes deteriorates the lumbar spine repositioning accuracy[2]. A good lumbosacral sitting posture could therefore be related to less overuse of the lumbosacral region while performing sedentary work. **Aim**: The purpose of this triple-blinded randomized controlled trial was to investigate if vibrotactile feedback 1) improves the time that office workers spent in a correct sitting posture 2) ameliorates repositioning sense and 3) stimulates lumbopelvic motor control. **Methods**: The control group (CG, n=12) and intervention group (IG, n=12) received standardized instructions concerning correct sitting. Afterwards, the IG received vibrotactile feedback during 7 workdays from the Profiler device. Pre- and post-measurements evaluated repositioning sense, motor control and sitting posture. The Profiler, a newly, valid and reliable device, was used during the intervention period and the measurements. It can monitor and assist the correction of the spinal posture by providing vibrotactile feedback when pre-programmed individual postural thresholds are exceeded. **Results**: In the IG, the absolute ($p=0.045$) and constant ($p=0.041$) repositioning error was significant lower at post-measurement compared to pre-measurement. However the IG sustained a poor sitting posture significantly longer ($p=0.017$) and needed a significant higher number of feedback times ($p=0.024$) in the last intervention session compared to the first. **Conclusion**: The present study showed that the repositioning capacity of the IG was significantly improved after seven workdays of vibrotactile feedback by using the Profiler.

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