22e SYMPOSIUM

VERENIGING VOOR KINESIOLOGIE

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Vrije Universiteit Brussel

"DIVERSITEIT IN BEWEGING"

22e Symposium van de Vereniging voor Kinesiologie

"DIVERSITEIT IN BEWEGING"

Vereniging voor Kinesiologie

VUB LICHAMELIJKE OPVOEDING & KINESITHERAPIE

Editor: Eva D'Hondt

VOORWOORD

Beste deelnemer,

Graag heet ik jullie in naam van ons bestuur welkom op het 22ste Symposium van de Vereniging Kinesiologie: **"Diversiteit in beweging"**. Prof. Caroline Pauwels, rector van de VUB, zal deze dag vol 'wetenschap van de bewegende mens en mens in beweging' inleiden. We zijn vereerd dat ze wat tijd heeft kunnen vrij maken in haar drukke agenda voor onze VK vereniging en haar jaarlijks Symposium.

Het centrale thema "Diversiteit in beweging" van onze sprekers in de voormiddag belicht vanuit verschillende invalshoeken het divers-zijn in de sport. Deelnemen als transgender in de sport, integratie via sport bij kansarmen en presteren als topsporter in de Paralympische spelen vormen drie topics waarbij we met een verscheidenheid aan wetenschappelijke invalshoeken naar diversiteit kunnen kijken.

De mondelinge presentaties en posterpresentaties in de (na)middag tonen het brede onderzoeksveld van de bewegings- en revalidatiewetenschappen, door jonge doctoraats- en masterstudenten 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 (posterprijs masterstudenten, posterprijs PhD studenten, mondelinge presentatie PhD studenten). Ook vragen we om actief mee de Publieksprijzen aan te duiden door mee te stemmen op uw favoriete bijdrage via polleverywhere aan het einde van de dag. 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.

Als 'forum' willen we u een fijne en boeiende dag vol onderzoek en wetenschap 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'. Hiervoor creëerden we dan ook wat meer ruimte in het programma.

We ronden het Symposium af met een korte algemene ledenvergadering en de uitreiking van de prijzen, nadien volgt een receptie. Tot slot nodigen we jullie graag uit om mee te werken aan de verdere uitbouw van de nieuwe VK website www.verenigingkinesiologie.be (onderzoeksgerelateerde foto's, update joblist, aankondiging doctoraten, …).

Graag wil ik ook de bestuursleden en collega's uit VUB bedanken om de praktische organisatie van dit 22ste VK Symposium voor hun rekening te nemen.

Martine Thomis

Voorzitter Vereniging Kinesiologie

PROGRAMMA VK SYMPOSIUM 2017

VUB – Campus UZ Jette

"Diversiteit in beweging"

8u45 **Registratie en welkom (Auditorium 1)**

9u00 Verwelkoming door Prof. Dr. Caroline Pauwels (Rector VUB)

9u05-9u30 *Thema-spreker 1:* Lozano Lafertin (Cavaria / Rebus): Trans* in sport

9u30-09u55 *Thema-spreker 2:* Rein Haudenhuyse (VUB): Integratie via sport in een tijdperk van superdiversiteit en neoliberalisme: what can we expect?

9u55-10u20 *Thema-spreker 3:* Debbie Van Biesen (KUL): De Paralympische Spelen – Op het kruispunt van diversiteit, uitmuntendheid, inclusie, en wetenschap

10u25-10u45 **Koffiepauze (Atrium – Forum) + Poster ophangen**

10u50-12u05 Mondelinge presentaties I (Gaston Beunen prijs) – 5 sprekers

12u10-12u40 **Broodjeslunch (Atrium – Forum)**

12u40-13u40 Posterwandeling (Atrium – Forum)

13u45-15u00 Mondelinge presentaties II (Gaston Beunen prijs) – 5 sprekers

15u05-15u25 **Koffiepauze (Atrium – Forum)**

15u30-16u00 Mondelinge presentaties III (Gaston Beunen prijs) – 2 sprekers

16u00-16u20 Stemming Publieksprijs en Bekendmaking Gaston Beunen prijs
+ Algemene ledenvergadering door Prof. Dr. Martine Thomis (Voorzitter VK)

16u25 **RECEPTIE (Atrium – Forum)**

HOOFDSPONSER SYMPOSIUM

Ochtendsessie

Het ochtendprogramma wordt traditioneel ingevuld door keynote lectures gegeven door specialisten inzake het centrale thema van het symposium. Dit jaar worden deze verzorgd door Lozano Lafertin, Rein Haudenhuyse en Debbie Van Biesen, die elk vanuit hun eigen invalshoek en expertise het topic "Diversiteit in beweging" zullen benaderen.

9u05-9u30 *Thema-spreker 1:*

Lozano Lafertin (Cavaria / Rebus): Trans* in sport

9u30-09u55 *Thema-spreker 2:*

Rein Haudenhuyse (VUB): Integratie via sport in een tijdperk van superdiversiteit en neoliberalisme: what can we expect?

9u55-10u20 *Thema-spreker 3:*

Debbie Van Biesen (KUL): De Paralympische Spelen – Op het kruispunt van diversiteit, uitmuntendheid, inclusie, en wetenschap

Deelnemers Gaston Beunen VK-prijs en Publieksprijs:

PhD studenten – MONDELINGE PRESENTATIES

Iedere jonge onderzoeker, die zijn/haar doctoraat nog niet heeft verdedigd, kan deelnemen aan deze presentatiewedstrijd. De jury selecteerde vooraf uit de ingezonden abstracts van PhD studenten 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 en/of het publiek. De winnaar van deze wedstrijd krijgt een geldprijs, terwijl de als 2e en 3e gerangschikte laureaten geproclameerd worden.

Dit jaar werden de volgende deelnemers geselecteerd:

SESSIE 1: 10u50-12u05

- Eline Lievens (UGent)
- Nolan Herssens (UAntwerpen)
- Jens De Rycke (VUBrussel)
- Silke De Waelle (UGent)
- Lingxiao He (KULeuven)

SESSIE 2: 13u45-15u00

- Laurent Degroote (UGent)
- Nikki Rommers (VUBrussel)
- Maxime Hanssen (UGent)
- Maarten Afschrift (KULeuven)
- Nele Huys (UGent)

SESSIE 3: 15u30-16u00

- Yanni Verhavert (VUBrussel)
- Pieter Van den Berghe (UGent)

Can non-invasively determined muscle typology predict fatigue and recovery profile?

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It is well-known that human fast-twitch (FT) muscle fibers are faster fatigued and require a longer recovery period, compared to slow-twitch (ST) fibers. The transfer of this knowledge to the recovery from exhaustive training and matches in athletes with a diverging muscle typology, is hampered by the invasive nature of the current evaluation of the muscle fiber type composition by biopsies. Recently, muscle carnosine quantification by proton magnetic resonance spectroscopy (1H-MRS) was developed as a new non-invasive estimation method (Baguet et al., 2011). The aim of this study was to investigate if subjects with a FT profile are characterized with a more pronounced Wingate-induced fatigue and delayed recovery compared to the ones with a ST profile. Thirty two male participants were scanned by 1H-MRS according to Baguet et al. (2011) and were included if the Z-score of the carnosine concentration in their gastrocnemius muscle was < -0.5 (ST) or > 0.5 (FT) compared to the reference population (98 men). Ten subjects with FT (VO2max: 4.3±1.0 L/min) and 10 subjects with ST typology (VO2max: 4.8±1.0 L/min) underwent the test protocol, consisting of three 30'' all-out Wingate tests (Cyclus), interspersed with 4 min of rest. Before and 10, 20, 30, 50, 80, 120 and 300 min after the repeated Wingates, knee extension force was evaluated by isometric maximal voluntary contraction (Biodex) and electrical femoral nerve stimulation (100Hz, 10Hz, and twitch; Digitimer, DS7A). Although total work done during the Wingates was equal in both groups, the mean fatigue index (FI) of the Wingates was higher in FT (FI: 53±6 %) versus ST subjects (FI: 40±7 %). The decline in peak torque 10 min after the Wingates was significantly higher in FT versus ST subjects (25±12 % and 7±9 % respectively) and the recovery to baseline torque took longer in the FT (5 h) compared to the ST group (30 min). Similar findings were observed for electrically-stimulated knee extension force. Our findings suggest that MR-based estimation of muscle fiber type composition can predict the extent of fatigue and the time profile of force recovery following repeated maximal all-out exercise. This has important applications as a non-invasive tool for individualizing advice for frequency of and muscle recovery from intensive training.

Reference:
Baguet et al. (2011). PLoS ONE, 6, e21956

On the effect of noisy galvanic vestibular stimulation on dynamic visual acuity in bilateral vestibulopathy

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Introduction and Aim. The vestibular system provides a gravito-inertial reference for balance control, which is failing in patients with bilateral vestibulopathy (BV)[1]. Recent studies[1,2] have evaluated the potential of noisy galvanic vestibular stimulation (nGVS) to upregulate primary vestibular afferent and hair cell activity by means of stochastic resonance. Improvement in vestibular balance control and postural stability has been observed[3]. NGVS involves noninvasive neuromodulation through direct current transferred by means of two gel-soaked surface electrodes placed over the left and right mastoid process. The electrical signal consists of zero-mean Gaussian white noise within a frequency range of 0 to 30 Hz. The peak amplitude is set to 80% of the cutaneous threshold (maximum output of 10 mA). The primary aim was to study the effect of nGVS on dynamic visual acuity (DVA) in BV patients.

Methods. Nine patients were included according to the diagnostic criteria suggested by the Barany society. Health-related quality of life was evaluated through the Dizziness Handicap Inventory (DHI). NGVS was applied while walking on a treadmill at preferred speed. Gaze stabilization was tested with the DVA test, with and without nGVS. The correlation between DHI (sub)scores and change in DVA performance was studied.

Results. Age ranged from 28.13 to 73.27 years (5:4 male-female ratio). Etiologies included idiopathic BV (n=2), gentamicin toxicity (n=2), auto-immune inner ear disorder (n=2), meningitis (n=2) and bilateral vestibular neuritis (n=1). Total DHI scores ranged from 0 to 84. DVA performance remained stable in 5/9 patients, three patients performed better with nGVS and one patient performed worse. The “Physical” subscore of the DHI demonstrated a strong correlation (r=-0.684, p=0,042) with an improvement in DVA scores during nGVS.

Conclusion. This pilot study provides preliminary data suggesting that noisy galvanic vestibular stimulation could be effective in improving gaze stabilization in a subset of patients suffering from bilateral vestibulopathy.

References:

[1] Wuehr et al. J Neurol (2017) 264 (Suppl 1):S81-S86; [2] Wuehr et al. Brain Stimul (2017); [3] Iwasaki et al. Neurology (2014) 82:969-975

What is the societal impact of elite sport?
Measuring public perceptions through an innovative scale

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Research question. As nations are increasingly investing public money in elite sport, policy makers are required to justify their decisions. A commonly used justification is that elite sport will trigger a wide range of benefits for the population. However, robust empirical evidence is limited and tools to evaluate the societal impact are lacking. Therefore, this study aimed to develop and test a quantitative measurement scale assessing the public's perception of the positive and negative societal impact of elite sport.

Research methods. Scale development commenced by formulating items based on a total of 84 societal impacts of elite sport, detected during a systematic review. Next, a representative sample from the Belgian population (n=1102) was surveyed. An exploratory (EFA) followed by two confirmatory factor analyses (CFA) ware performed to assess and increase the scale's adequacy. Multivariate analysis was employed to examine the role of contextual and individual variables.

Results and Findings. After a process of item exclusion, a 32-item model remained from which the goodness-of-fit indices were excellent, indicating high reliability. Furthermore, the results indicate that the Belgian population generally perceived more positive than negative societal impacts of elite sport.

Implications. The developed Measuring Elite Sports' Societal Impact (MESSI) scale can serve as a useful tool for researchers seeking to measure the positive and negative impacts of elite sport to society and compare them across different nations. Moreover, the MESSI results could support evidence-based decision-making regarding elite sport investments.

Measuring perceived motor competence: A comparison between different instruments

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Introduction. Previous research has shown physical activity to be beneficial for children's and adolescents' physical and mental health and higher levels of motor competence to be associated with higher levels of physical activity. However, it remains unclear how perceived motor competence (PMC) relates to actual motor competence (AMC) and physical activity. Recently, researchers have been trying to answer this question by using a number of different questionnaires to measure PMC, complicating comparison between different studies. Therefore, this study aims (1) to identify the questionnaire for PMC providing the closest match with AMC, and (2) to examine potential correlates of the relationship between AMC and PMC.

Methods. We recruited 409 Flemish students from 10 different secondary schools. AMC was measured using the Test of Gross Motor Development-2nd Edition (TGMD-2), PMC was measured using four different questionnaires: the Self-Description Questionnaire (SDQ), the Physical Self-Description Questionnaire (PSDQ), the Physical Self-Confidence Scale (PSC) and the Physical Self-Perception Profile for Children and Youth (PSPP-CY).

Results. The PSDQ ($r=0,422$, $p<0,001$) and SDQ ($r=0,467$, $p<0,001$) showed stronger correlations with the TGMD-2 than the PSPP-CY ($r=0,372$, $p<0,001$) and PSC ($r=0,413$, $p<0,001$), though these differences showed no statistical significance. However, correlations between AMC and PMC differed depending on sex, where boys' PMC showed significantly stronger correlations with AMC than girls' for the SDQ ($p=0,060$) and PSDQ ($p=0,045$). Furthermore, youngsters who completed the TGMD-2 before filling out the questionnaires, showed higher correlations between the TGMD-2 and the PSDQ ($p = 0,052$) and SDQ ($p = 0,013$) than those who filled out the questionnaires first. The PSPP-CY only showed different correlations with the TGMD-2 depending on testing order ($p =0,030$), while the PSC showed no differences in correlations with the TGMD-2 depending on testing order nor sex.

Conclusion. Measuring PMC is challenging and the strength of the correlation with AMC depends on a number of different factors such as sex and testing order. It seems crucial to take this into consideration when measuring PMC and when conducting research concerning AMC and PMC or the relation between PMC and health related benefits.

Associations of nutrient factors with muscle strength and morphology in elderly women

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Introduction. The decrease of muscle strength and the change in muscle morphology are two prominent characteristics in ageing muscle. Although many studies have been done on the effects of diet and supplements on health status such as frailty and cancer in ageing populations, few findings are reported regarding the nutritional relationship with muscle strength and morphology. **Objective.** Explore the relation between nutrient intake and muscle strength as well as muscle morphology in an elderly female population. **Methods.** 308 elderly Caucasian women (70.7±5.7 yrs) with no history of neuromuscular disorders were recruited in the GEMAM study. Hand grip strength, isometric peak torque of elbow flexion ($PTIM_{EF}$) and knee extension ($PTIM_{KE}$) were measured on the dominant side using customized dynamometers. Thickness of biceps brachii and vastus lateralis muscles, anatomical cross section area (ACSA), pennation angle (PA) and fascicle length of vastus lateralis (VL) were measured using B-mode ultrasonography. Information of nutrient intake was collected through the EPIC-Norfolk Food Frequency Questionnaire. General linear regression analyses were performed with muscular parameters as dependent variables, and nutrient intake, age, body mass and height as independent variables. Additional analyses were made with daily energy intake as an extra independent variable. **Results.** After adjustment for daily energy intake, neither carbohydrate nor protein intake showed significant relationships with muscular parameters while fat intake was found negatively associated with VL_ACSA (p=.02, R^2=.022). Magnesium showed a positive relation with VL thickness (p=.04, R^2=.017). Three vitamins were closely related to $PTIM_{KE}$ (folate, B2 and D) and PA of VL (B12, D and E). Vitamin D was positively related to VL thickness (p=.02, R^2=.023) and PA (p=.01, R^2=.031). Similar to Vitamin E (p=.02, R^2=.020), cholesterol was found closely related to VL fascicle length (p=.01, R^2=.028). **Conclusion.** From our study, we find that some nutrients are significantly related to muscle strength and morphology in senior women. Vitamins explain 2.08 – 3.97 % of variation in strength and muscle morphology traits. This might be related to the role vitamins play in muscle metabolism, possibly mediated by DNA methylation.

The use of smart devices to measure physical activity in daily life: A validation study

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Background. Consumer-level devices for monitoring physical activity are increasingly popular. Not only consumers use them to monitor their own physical active behavior, but also researchers incorporate these devices to monitor physical activity in their studies, since these devices make it possible to track large samples. It is important to explore how accurately physical activity can be tracked via these devices. Therefore the aim of this study was to investigate concurrent validity of three Android Wear smartwatches (Polar M600, Huawei Watch, Asus Zenwatch3) and the Fitbit Charge with an ActiGraph accelerometer for measuring steps and MVPA (moderate-to-vigorous physical activity) on both a day and 15 min level.

Methods. A free-living protocol was used in which 36 adults engaged in usual daily activities over 2 days while wearing two different smartwatches on the same wrist (of the preferred hand) and an ActiGraph GT3X+ accelerometer on the hip. Validity was evaluated on both levels by comparing each smartwatch with the ActiGraph accelerometer, using correlations, Bland-Altman plots and regression analysis in SPSS 24.0.

Results. On a day level, all devices showed strong correlation (Spearman r: 0.757-0.892) and good agreement (ICC: 0.695-0.885) for measuring steps, but moderate correlation (Spearman r: 0.557-0.577) and low agreement (ICC: 0.377-0.660) for measuring MVPA. Bland-Altman revealed a systematic underestimation of the consumer-level devices for measuring steps, but a variation between over- and under-counting of MVPA. On a 15 minutes level, all devices showed strong correlation (Spearman r: 0.752-0.917) and good agreement (ICC: 0.792-0.887) for measuring steps, but weak correlation (Spearman r: 0.116-0.208) and low agreement (ICC: 0.461-0.577) for measuring MVPA. Bland-Altman revealed a systematic underestimation of the consumer-level devices for both steps and MVPA.

Conclusions. Generally, it can be concluded that all four consumer-level devices can be considered accurate step counters in free-living conditions. On the other hand, this study provides evidence of systematic bias for all devices in measurement of MVPA. The results on 15 minutes level also indicate that these devices are not sufficiently accurate to have the potential to provide exact real-time feedback.

Age and maturity related differences in motor coordination among male elite youth soccer players

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Elite youth soccer is characterised by constant selection of the best players. As youth academies of professional soccer clubs invest substantially in optimal development of talented youth players, there is a need for reliable talent identification factors. Therefore, the present study investigated the differences between age categories in several possible talent identification factors, as well as the confounding effect of maturity status (i.e. earlier, on time or later maturing). We investigated differences in generic and soccer-specific motor coordination as well as speed and agility depending on age and maturity status in elite youth soccer players (U10-U15, N=650). Measurements included body height, body weight and sitting height to estimate age at peak height velocity (APHV); three Körperkoordinationstest für Kinder (KTK) subtests (i.e. jumping sideways (JS), moving sideways (MS), balancing backwards (BB)) to assess generic motor coordination; the UGent dribbling test for soccer-specific motor coordination; a 5m/30m sprint and T-test for speed and agility. Age-specific z-scores of APHV identified players as earlier, on time or later maturing. (M)ANOVA analyses showed significant age by maturity interaction effects for the speed and agility test cluster ($p=0.001$), revealing maturity related differences in U14 ($p=0.04$) and U15 players ($p=0.013$). Next to an overall higher performance with age for all test clusters ($p<0.001$), earlier maturing players outperformed their later maturing peers in 5m/30m sprinting ($p<0.01$) and JS ($p=0.03$), whereas the opposite was seen for BB ($p=0.011$). Based on these results, we can conclude that players' maturity status should be taken into account to adequately value their performance in talent identification. Also, the focus on characteristics that appear to be minimally biased by maturational timing (such as generic and soccer-specific motor coordination) should be increased.

The protective effect of exercise on diabetic nephropathy:
The role of histidine-containing dipeptides

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Diabetic nephropathy, a microvascular complication of diabetes mellitus, is the main cause of end stage renal failure in the Western world. In humans, the susceptibility towards diabetic nephropathy is associated with a high activity of the serum carnosinase-1 enzyme (hCN1), which is genetically determined. This hCN1 enzyme hydrolyzes circulating histidine-containing dipeptides such as carnosine and anserine. Exogenous carnosine is protective towards the development of diabetic nephropathy in rodents, lacking the active hCN1 enzyme. Physical exercise is thought to enhance endogenous circulating histidine-containing dipeptides through an active release from contracting skeletal muscle (which contain the vast majority of carnosine storage). Therefore we hypothesize that the development of diabetic nephropathy will be attenuated by exercise, especially when hCN1 activity is low.

We divided 38 non-transgenic (hCN1-) BTBR ob/ob mice and 35 transgenic (hCN1+) BTBR ob/ob mice in two groups: rest and exercise. Exercise groups were subjected to a 20-week exercise intervention (running at 10 m/min, 5 days per week) to investigate the protective effect of exercise against diabetic nephropathy and the possible involvement of endogenous histidine-containing dipeptides.

Transgenic mice show a faster deterioration of lipid metabolism and a significantly greater glomerular hypertrophy (+17.7%, $p < 0.001$) compared to the mice lacking hCN1. Glomerular damage is correlated with lower levels of carnosine (Pearson $r = 0.604$, $p = 0.017$) and anserine (Pearson $r = 0.850$, $p < 0.001$) in the kidney.

Low hCN1 activity rather than exercise tends to evoke protective effects against diabetic nephropathy. This study is the first to confirm the renoprotective effect of renal histidine-containing dipeptides on a histological level.

Gluteus medius in stance and swing leg controls foot placement in perturbed walking

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Introduction. Medio-lateral stability during walking requires active control.[2] Hof et al. suggest that lateral imbalance following an external perturbation is mainly controlled by increased swing leg gluteus medius activity,[3] but others also observed increased stance leg gluteus medius activity.[1] We used forward simulations of walking based on a musculoskeletal model to evaluate the contributions of stance and swing leg gluteus medius activity on stability. **Methods.** Walking balance of 18 healthy young subjects was perturbed by means of a platform translation to the left of 4.5 cm after left heelstrike. The response to the perturbation was measured using motion capture and electromyography. First, we computed muscle excitations that drive the model by fitting the simulated to the experimentally observed unperturbed walking kinematics. Second, we simulated the instability caused by the perturbation by applying the perturbation to the model without modifying muscle activity. Third, we simulated the kinematic response of the model when either stance or swing leg gluteus medius activity was modified based on the measured muscle activity. **Results and discussion**. We observed a wide range of responses characterized by a significant increase of (1) stance leg, (2) swing leg, or (3) stance and swing leg gluteus medius activity after the perturbation. For all strategies, the simulated foot placement was close to experimental foot placement when the experimental modulation of gluteus medius activity was accounted for in the simulations. **In conclusion**, our simulations suggest that strategies relying on either stance or swing leg gluteus medius are effective to control of walking stability in response to a medio-lateral perturbation by contributing in a similar manner to medio-lateral foot placement.

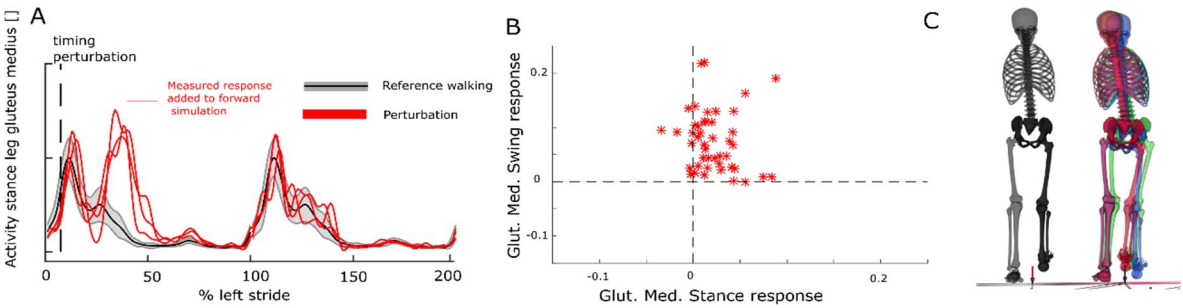

Figure 1: Change in stance leg gluteus medius activity after perturbation is shown for one subjects (A). A change in either stance, swing or combined activity was found during the first 300 ms after perturbation (B). The isolated effect of perturbation (red), swing (blue) and stance (green) on nominal walking kinematics (black) was evaluated using forward simulations (C).

References:

[1] Rankin, J. NeuroPhsyiology, 2014; [2] Hof, J. Exp Biol, 2010; [3] Hof J., Exp Brain Res, 2013.

Psychosocial correlates of objectively measured physical activity in higher and lower educated Belgian adults at risk for type 2 diabetes

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(on behalf of the Feel4Diabetes-study group)

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Purpose. Individuals with an increased risk for the development of type 2 diabetes (T2D) are an important target group for the prevention of diabetes. Their risk can be decreased by increasing their physical activity (PA) levels. However, studies show that socioeconomically deprived individuals are less likely to engage in PA. To tackle low levels of PA in low socioeconomic groups with an increased risk for the development of T2D in preventive interventions, it is important to gain insight in the correlates of this behavior. Nevertheless, literature on those correlates in this target group is inconclusive and to date, no studies used objectively measured PA. Therefore, the main aim of the present study was to investigate the moderating effects of socioeconomic status (SES) on the relationship between psychosocial factors and objectively measured PA in individuals with an increased risk on T2D. **Methods**. In Flanders, Belgium, adults with an increased risk for T2D (based on the Finnish Diabetes Risk Score) were selected in 11 low SES neighborhoods. Data were collected between March and August 2016. Participants filled out a questionnaire on socio-demographic variables, health behavior and psychosocial correlates and wore an ActiGraph accelerometer for 5 consecutive days. The final sample consisted of 164 adults (mean age: 38; 13,4% men). Statistical analyses were performed using ANCOVA models. **Results.** Descriptive results showed that low SES adults had less moderate to vigorous PA, more light PA and more overall total PA than high SES adults. SES was only a significant moderator of the associations between weight perception and light PA on weekend days ($p = 0.017$) and total PA on weekend days ($p = 0.049$). In low SES participants, adults who perceived their weight as underweight or normal were more physically active and in high SES participants, adults who perceived their weight as overweight were more physically active. SES was no significant moderator of the associations between all other psychosocial correlates and PA-variables. **Conclusion.** It is not necessary to tailor interventions targeting psychosocial correlates of PA in adults with a higher risk for the development of T2D to specific SES-groups.

Defining and assessing core stability: A systematic review

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Purpose. Although core stability is a popular concept in sports and medicine and it is frequently incorporated in training and rehabilitation programs, there is no single clear definition and assessment method of core stability. To get more insight into this, an overview of all existing definitions and assessment methods is needed, which, to the best of our knowledge, is not done yet in current reviews.

Methods. A systematic literature search was conducted following the PRISMA guidelines. PubMed, Web of Science, SportDiscus and Embase were searched for relevant articles. Results were limited to original English written articles published in full-text format in peer reviewed journals between January 2000 and January 2017, defining and measuring core stability.

Results. Fifty-five articles were included in the qualitative synthesis. Fifty-one studies mentioned and/or investigated assessment methods of core stability, only three of the fifty-one studies mentioned a self-developed definition. Another four studies also mentioned a self-developed definition of core stability. In total, six different definitions of core stability and 63 different assessment methods measuring components of core stability were found.

Conclusion. There is a need to develop a single universally accepted definition and assessment method of core stability, evaluating core stability as a whole. After developing and validating the assessment method, future research will be able to investigate the role of core stability in sport performance, injury prevention and daily life conditions.

Converted forefoot striking differently affects parameters of impact intensity in overground running

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Background. Loading of the musculoskeletal system has been key in the ongoing footstrike pattern debate (Hamill and Gruber, 2017). Impact loading is typically assessed in the vertical dimension, however, three-dimensional analysis may provide a more complete measure of impact intensity. **Aim.** This study evaluated parameters of 3D impact intensity during habitual rearfoot and converted forefoot striking in overground running at submaximal speed. **Methods.** 3D tibial accelerations and ground reaction forces, and 1D plantar pressures were collected in 14 rearfoot runners (age: 32±13 y; body length: 1.75±0.09 m; body weight: 69±9 kg; weekly running volume: 33±12 km; self-reported training speed: 3.12±0.99 m*s^{-1}) during preferred rearfoot striking and converted forefoot striking through verbal instruction when running at 3.20±0.20 m*s^{-1}. Paired t-tests (alpha=0.05) examined differences in strike index, in peak tibial accelerations and in peak loading rates of ground reaction forces between footstrike patterns. **Results.** Impact intensity and the strike index changed ($p \leq 0.004$) when evoking a shift from rearfoot to forefoot striking (Table 1). The tibial shock did not significantly change in its axial direction ($p=0.307$). **Conclusion.** Acutely transitioning to a more anterior footstrike pattern increased the resultant peak tibial acceleration due to increased shocks in the transversal plane, although peak loading rates of ground reaction forces decreased. The differential effect on impact intensity parameters can affect the choice of the input signal for provision of biofeedback on tibial shock per wearable across footstrike patterns.

Table 1. Parameters of impact intensity and the strike index between foot contact patterns (mean±SD).

Variables	Habitual rearfoot	Converted forefoot	*p*-value	Effect size (d)
Resultant peak tibial acceleration (g)	8.62 ± 2.40	16.24 ± 4.03	<0.001	1.63
Axial peak tibial acceleration (g)	6.35 ± 1.46	5.90 ± 1.17	0.307	0.28
Resultant loading rate (BW*s^{-1})	99.74 ± 21.47	79.95 ± 14.61	0.004	0.94
Vertical loading rate (BW*s^{-1})	98.87 ± 21.44	65.32 ± 5.64	<0.001	1.57
Strike index	0.11 ± 0.02	0.69 ± 0.05	<0.001	10.67

Reference:
Hamill J. and Gruber A. H. (2017). *JSHS*, 6(2), 146–153.

Deelnemers Gaston Beunen VK-prijs en Publieksprijs:

PhD studenten – POSTER PRESENTATIES

Iedere jonge onderzoeker, die zijn/haar doctoraat nog niet heeft verdedigd, kan deelnemen aan deze presentatiewedstrijd. De kandidaten krijgen daarbij 2 min tijd om hun werk in postervorm te presenteren, waarna er gedurende 3 min vragen kunnen gesteld worden door de jury voor PhD studenten. Deze juryleden zullen tijdens de daartoe voorziene posterwandeling elke deelnemende poster aandoen. De winnaar van deze wedstrijd krijgt een geldprijs, terwijl de als 2e en 3e gerangschikte laureaten geproclameerd worden.

Dit jaar zijn dat de volgende deelnemers:

- Sara Blocquiaux (KULeuven)
- Laurent Chapelle (VUBrussel)
- Christophe Dausin (KULeuven)
- Felien Laureys (UGent)
- Pingwei Li (VUBrussel)
- Joren Loockx (KULeuven)
- Niels Mertens (KULeuven)
- Jacqueline Patatas (VUBrussel)

Resistance training, detraining and retraining in the EPIK study

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Introduction. Ageing is accompanied by a progressive decline in muscle mass and strength, imposing a huge burden on our health care system. Resistance training (RT) can be used as a preventive strategy to (partially) reverse these losses. The EPIK study aims to study the role of epigenetic mechanisms in these adaptations. The present analyses report to RT, detraining and retraining on muscle strength in young and older men.

Methods. Thirty healthy older (66.2y ± 5.2) and five young (22.1y ± 1.7) subjects followed a training (high intensity whole-body RT), detraining (rest or casting) and retraining period of each twelve weeks. Every four weeks during (re)training, the 1-repetition maximum (1RM) was determined on the leg press. Quadriceps strength (Biodex Medical System 3® dynamometer), anthropometric measurements (circumferences and skinfolds) and body composition (bio-electrical impedance analysis) were assessed after each period. Additionally, an older control group of ten men (64.8y ± 5.0) was measured at each time point.

Results & discussion. A high intensity RT program significantly altered muscle strength parameters in young and elderly men to a comparable degree (Table 1). Strength gains were not fully lost after twelve weeks of detraining in the elderly men. Two weeks of right leg immobilization in the young men on the other hand had a more profound effect on strength parameters. Twelve weeks of retraining was enough to regain post training strength levels, but the increase was not as marked as during the first training period.

Table 1. Muscle strength parameters (mean ±SD) in the EPIK study

	Training effect (%)	Detraining effect (%)	Retraining effect (%)
Older men			
- 1RM	36.2 (±10.8) *	-12.6 (±3.8) *	23.0 (±7.6) *Δ
- Isometric (90°)	9.9 (±13.5) *	-4.6 (±5.9) *	7.8 (±9.5) *
- Isometric (60°)	15.5 (±13.1) *	-5.0 (±8.1) *	2.0 (±7.1) Δ
- Isokinetic (60°/sec)	14.5 (±14.5) *	-5.2 (±12.0)	5.8 (±10.1) *Δ
Young men			
- 1RM	34.3 (±7.1) *	-13.9 (±7.3) *	21.5 (±7.6) *
- Isometric (90°)	0.9 (±7.8)	-18.0 (±6.2) *¥	29.2 (±8.9) *Δ¥
- Isometric (60°)	14.9 (±17.7) *	-6.8 (±7.2)	9.9 (±5.7) *¥
- Isokinetic (60°/sec)	14.2 (±6.4) *	-20.1 (±3.9) *¥	26.7 (±4.7) *¥

Repeated measures with Bonferroni post-hoc comparison: * $p < 0.05$, significant effect; Δ $p < 0.05$, significantly different from the training effect; ¥ $p < 0.05$, significantly different from the older men

Upper extremity Bone Mineral Content asymmetries in tennis players: A systematic review and meta-analysis.

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Bone tissue will adapt to mechanical loading by increasing bone mass and bone size, which can be quantified by measuring bone mineral content (BMC). If, however, only the bones of the dominant upper extremity are exposed to repetitive mechanical loading asymmetries between the dominant and nondominant upper extremity will develop. Therefore, as a unilateral sport, tennis is ideally suited to examine the effects of repetitive mechanical loading since both upper extremities are subject to similar intrinsic factors (including genetic, nutritional and neurohormonal aspects), while only the dominant upper extremity is exposed to intensive and repetitive mechanical loading. Although upper extremity BMC asymmetries in several tennis populations of different ages and competition levels have already been well documented, a meta-analysis to quantify the magnitude of these upper extremity BMC asymmetries in tennis players is lacking. Accordingly, the aim of this meta-analysis was to examine and report the magnitude of upper extremity BMC asymmetries in tennis players. Furthermore, the influence of sex (males vs. females), chronological age (junior: < 18 years; adult: 18-39 years and senior: ≥ 40 years) and starting age (early starters: < 14 years vs. late starters: > 18 years) on these BMC asymmetries were examined. The Pubmed and Web of Science databases were searched for scientific articles that examined upper extremity BMC in tennis players. All individual study effect sizes were calculated and reported as standardised mean differences (SMD). Pooling of the individual study effect sizes was conducted using the random-effects model based on the inversed-variance method to calculate the individual studies' weighting factors. Three subgroup meta-analyses were conducted to assess the influence of sex, chronological age and starting age on upper extremity BMC asymmetries. Out of the 15 included studies, 24 effect sizes were extracted resulting in a significant difference in BMC value between the dominant and nondominant upper extremity of the tennis players (SMD: 0.85 [95% CI: 0.67 – 1.03]). The three subgroup analyses all showed medium to strong effect sizes and significant intergroup differences. To conclude, BMC was significantly higher in the dominant upper extremity compared to the nondominant upper extremity in tennis players due to repetitive asymmetrical mechanical loading. Nevertheless, the influence of training volume and playing experience on the magnitude of these asymmetries are yet to be examined.

Validation of Lactate Minimum Power testing in elite cyclists

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Introduction. Physiological profiling of elite endurance athletes should at least include determination of FATmax, maximal lactate steady state (MLSS) and VO2max. To improve determination of these three parameters in a single test session, we used the "lactate minimum power (LMP)" concept proposed by Tegtbur et al. in 1993[1]. This procedure involves a maximal exercise bout to first substantially elevate blood lactate concentration, where after a submaximal incremental exercise bout, gradually shifts blood lactate balance from net lactate clearance to net accumulation. The nadir of the U-shaped blood lactate curve so obtained is believed to identify MLSS exercise intensity. In the current study we aimed to evaluate (1) the validity of LMP to determine MLSS, and (2) to develop a practical test protocol to precisely determine FATmax, MLSS and VO2max in a single laboratory exercise session in elite cyclists. **Methods.** Ten male well-trained cyclists (VO2max 61±6ml•kg^{-1}•min^{-1}) completed different tests on different days: a long maximal incremental exercise test (100W + 40W per 8 min); an LMP protocol; 2 or 3 constant-load MLSS tests. During the maximal incremental test FATmax was determined as the exercise intensity corresponding to a +0.5mmol•l^{-1} blood lactate increment above baseline, and MLSS was estimated by the lowest workload eliciting a >1mmol•l^{-1} rise from min 4 to 8. The LMP protocol started with a VO2max ramp (100W +25W per 30sec) to increase blood lactate concentration. Upon exhaustion workload was reduced to 85% of the predicted MLSS, where after workload was increased by 5% of MLSS per 3 min till volitional exhaustion. Blood lactate was measured at the end of each step. MLSS in the constant-load tests was taken as the highest workload, which could be maintained for 30min with a constant ($\Delta \leq$ 1mmol•l^{-1}) blood lactate level between min 10 and 30. **Results.** MLSS power output determined from the constant-load tests was 265±38W. MLSS prediction from the LMP test was 270±37W, and LMP was very closely correlated with the true MLSS (r=0.93, p<0.05). VO2max was slightly higher in the short ramp protocol than in the long incremental exercise test (63.9±7.1 vs. 61.4±6.9 ml•min^{-1}•kg^{-1}, p<0.05). **Conclusion.** It is concluded that an LMP test including a VO2max ramp, yields valid measurements of both MLSS and VO2max.

Reference:
Tegtbur U, Busse MW, Braumann KM. Med Sci Sports Exerc 1993;25(5):620–7.

The value of the PCDEQ2v2 psychological questionnaire in a multidimensional gymnastics test battery

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Introduction. Talent Identification and Development (TID) research has recently focused more on extensive multidimensional models. One such example is Vandorpe et al. (2012) who proved that, with a multidimensional test battery for gymnasts, the talent prediction is even better in comparison with the eye of the expert or the anthropometric and physical measures separately. Unfortunately, several performance characteristics are still missing in these TID models, such as the psychological skills. In this study, a primary step to see whether psychological skills can have an extra value in a multidimensional test battery for female gymnasts is taken. **Methods**. A total of 57 8-year old female gymnasts conducted anthropometrical, physical and motoric test at an entry day organised by the Gymnastics Federation. Based on these and the sport-specific tests (not taken into account in this study), the coaches decided which gymnasts could enter the talent development programme or not. Afterwards, both the selected and non-selected gymnasts were contacted again and completed the test battery by filling in the "Psychological Characteristics of Developing Excellence Questionnaire 2 version 2" (PCDEQ2v2). This questionnaire was translated, modified and validated within this study. **Results**. First the validation of the PCDEQ2v2 was checked using a reliability analysis. The Cronbach Alpha for 5 out of 7 factors on the questionnaire was good to high. The overall internal consistency was good (Cronbach Alpha=0.749). Second, results with a MANOVA showed no differences between the selected and non-selected gymnasts in anthropometrical, physical, motor coordination and psychological skills. Lastly, a binary logistic test was performed where the psychological characteristics had no significant predictive value, in contrast to the other factors. **Conclusion**. Unexpectedly, no significant differences appeared between the selected and non-selected gymnasts based on the test battery and the PCDEQ2v2. This could be because the groups tested are too homogeneous or worse-performing gymnasts were already filtered out due to the (natural) selection process that starts at an early age and/or the exclusion of drop-out gymnasts in this study. Other reasons could be that the selection process of the Gymnastics Federation is disputable or the gymnasts were simply too young. Furthermore, no psychological predictors were found using the binary logistics test. Consequently, it is hard to say if the psychological component has an added value in the multidimensional test battery.

The road to success: A longitudinal study of the career trajectory of top elite tennis players

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Introduction. In professional tennis, the career trajectory from starting age to the top podium of professional tennis remains unknown. The aim of this research is to highlight the characteristics of the career trajectory of the most successful professional tennis players and to establish a range of statistical benchmarks that coaches and federations can use for player development.

Method. Data were obtained from official website of ITF, WTA and ATP. The names and birthdates of all players that achieved a top 10 year-end ranking between 2007 and 2017 were recorded. Player career trajectory is examined by four distinguishable stages, initial years, ITF Junior-circuit, ITF pro-circuit and WTA/ATP tour. The first participation and title at the four stages and the significant rankings were recorded as benchmarks. All the dates of the benchmarks were converted to chronological age based on players' birthdates. A boxplot was applied to depict the age distribution by each milestone of all top 10 players. Independent T test and One-way ANOVA were applied to test the differences between genders and between ranking levels.

Result. Both male and female top 10 players started playing tennis at an average age of 5.5 years old. 50% of the female players participated first ITF junior circuit at the age of 13.6 years, reaching their best junior performance at the age of 16.0 years. It takes an average 1.9 years from first WTA title to top 10 world ranking at the age of 22.1 years. In contrast, 50% of the male players made their ITF junior debut at an average age of 14.9 years, reaching their best junior performance at the age of 17.2 years. It takes an average 2.9 years from first ATP title to top 10 at the age of 23.1 years.

Conclusion. It takes almost 10 years for talent players from starting age to reach international junior top and another 10 years to reach senior top 10 ranking; players follow a similar trajectory at a junior age, have a fast ascending speed to top 100 ranking but varies from to 100 to top 10. Higher ranked players appear to reach benchmark earlier than lower ranked players.

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Machar, R., Craig, M. (2010). Ranking benchmarks of top 100 players in men's professional tennis European Journal of Sport Science, 350-355.

McCraw, P. D. (2009). Transition from top 10 ITF juniors to top 100 ATP tour.

Het effect van specifieke vakkennis op het leren en onderwijzen van zwemmen in een context van diversiteit

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Achtergrond. Onderzoek toont aan dat pre- en in-service leraren vaak over te weinig vakkennis beschikken (Ward e.a., 2013). Nochtans blijkt deze kennis essentieel in functie van het leereffect bij leerlingen, ongeacht hun motorische vaardigheid (Iserbyt e.a., 2015).

Opzet. Het effect van een vakinhoudelijke workshop zwemmen onderzoeken op het leren en onderwijzen van zwemmen in het ASO en BuSO.

Methoden. Zes klassen werden willekeurig verdeeld in twee groepen (voor en na de workshop). Twee leerkrachten gaven aan beide groepen een lesperiode crawl. Het lerarengedrag, met betrekking tot de visuele en verbale taakpresentatie, voor en na de workshop werd vergeleken. Daarnaast werd het leereffect bij de leerlingen onderzocht, op vlak van de sprinttijd en slagfrequentie over 50m.

Resultaten. Hoog- en laagvaardige leerlingen die les kregen na de workshop boeken een niet-significante, maar sterkere vooruitgang op vlak van sprinttijd, ten opzichte van leerlingen die les kregen voor de workshop. Dezelfde trend werd gevonden voor zowel jongens als meisjes, en voor zowel leerlingen uit het ASO als leerlingen uit het buitengewoon secundair onderwijs.

Discussie. Specifieke vakkennis realiseert een ander leraargedrag en een leereffect bij leerlingen, ongeacht het vaardigheidsniveau of onderwijstype.

Referenties:

Iserbyt, P., Ward, P., & Martens, J. (2015). The influence of content knowledge on teaching and learning in traditional and sport education contexts: an exploratory study. Physical Education and Sport Pedagogy, 21(5), 539-556.

Ward, P., Ince, M. L., Iserbyt, P., Kim, I., Lee, Y. S., Li, W., et al. (2013). International physical education teacher education physical activity content knowledge study. Research Quarterly for Exercise and Sport, 84 Supplement, A4.

Leadership network analysis of semi-professional soccer teams

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In this study, we investigated the leadership networks of 29 semi-professional Belgian soccer teams (N = 628) throughout the season (i.e., three measurement points; start of preparation (T1), halfway the season (T2), end of the season (T3)) for four leadership roles, namely the roles of task, motivational, social, and external leader. Each soccer team was assigned to one of three conditions. The coaches of the teams in the first condition received at T2 insight on their team's leadership networks, which was used to formally appoint leadership teams on each of the four leadership roles. In the second condition, the coaches received at T2 the same information as in the first condition. Additionally, we implemented an intervention program designed to strengthen those players' leadership skills. The third condition served as control condition.

For each of the conditions, and for each of the leadership networks (i.e., task, motivational, social, and external leadership), we tracked two key attributes over time, namely, the network density (i.e., the average score of leadership perceptions in the team) and the network centralization (i.e., the extent to which leadership is shared amongst team members).

The results reveals a trend towards shared leadership for both task and external leadership at the start of the season (T1-T2), without an intervention taking place (i.e., significant drop in network centralization). Furthermore, the findings demonstrated that our leadership intervention (i.e., both condition 1 and 2) was able to further increase the this trend towards more shared leadership. This trend was, however, for most leadership roles (except for social leadership) not significant, probably due to the larger dropout in the last measurement point.

Findings will be further discussed in the light of the extent to which coaches effectively implemented our intervention in the different teams.

In pursuit of gold: Uncovering paralympic elite athletes' pathways

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An athlete development pathway describes the continuum of athletic development, from initiation of fundamental movement skills through a lifelong engagement and proficiency at an elite level. Several researchers have attempted to outline athlete development frameworks and highlighted different stages in mainstream sport (Balyi & Hamilton, 2004; Gulbin et al., 2013; Sotiriadou et al., 2008). However, most of these frameworks are sport generic and none thus far have attempted to outline Paralympic elite athletes' pathways (PEAP). The aims of this study are to gain an understanding of the development phases of PEAP in sport and to identify the parasport unique characteristics that have an impact throughout these phases. The long-term goal is then to develop a framework of reference for further exploration. The Brazilian Paralympic sport context was used as a case study and 32 face-to-face semi-structured in-depth interviews were conducted with the main stakeholders from the Brazilian Paralympic Committee. The interview transcripts were subjected to a thematic analysis (Patton, 2002), combining inductive and deductive reasoning. This study outlines different phases and transitions in the PEAP. The results elucidate the commonalities of each development phase, the differences among impairment groups, the influence of the classification and its implications. The wider understanding of how Paralympic elite athletes' pathways are developed can assist sport organisations and stakeholders in using impairment-specific approaches to better recruit and develop para-athletes to seek a successful pathway. This study contributes to the body of knowledge in this area by identifying and understanding particular elements within the pathways phases that require modification to the parasport context.

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Deelnemers Gaston Beunen VK-prijs en Publieksprijs:

Masterstudenten – POSTER PRESENTATIES

Elke masterstudent met een voorliefde voor onderzoek kan met zijn/haar werk deelnemen aan deze presentatiewedstrijd. De kandidaten krijgen daarbij 2 min tijd om hun werk in postervorm te presenteren, waarna er gedurende 3 min vragen kunnen gesteld worden door de jury voor masterstudenten. Deze juryleden zullen tijdens de daartoe voorziene posterwandeling elke deelnemende poster aandoen. De winnaar van deze wedstrijd krijgt een geldprijs, terwijl de als 2e en 3e gerangschikte laureaten geproclameerd worden.

Dit jaar zijn dat de volgende deelnemers:

- Sander De Bock (UGent)
- Joren De Bruyne (UGent)
- Sam De Hert (VUBrussel)
- Camille Dewaele (VUBrussel)
- Dries Pluym (VUBrussel)
- Lezyl-Jane Van Roy (VUBrussel)
- Roxane Roosens & Lientje Vanderlinden (VUBrussel)
- Naaike Verhaege (VUBrussel)
- Marie Vermote (VUBrussel)
- Griet Warlop (UGent)

Diving response: An argument for the Aquatic Ape Theory in human evolution?

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Introduction. The Aquatic Ape Theory suggests human ancestors came to ground-level during evolution, to live in aquatic environments.[1] Humans are believed to have developed adaptations to an aquatic lifestyle, e.g. the diving response (DR). Characterized by bradycardia and peripheral vasoconstriction, the diving response has an O_2-conserving effect.[2] This study tested the occurrence of the diving response during dynamic apnea with facial immersion (DAFI) and compared physiological characteristics in apnea trained and non-apnea trained athletes in rest and during DAFI. **Methods.** Ten apnea trained and ten non-apnea trained athletes executed 5 maximal static apneas, a maximal incremental ramp cycling test and an endurance cycling test at 25% of their maximal power output, during which the HR was monitored continuously. Every 4 min, a 30 s apnea while cycling with facial in cold water was performed. Two-way Repeated Measures Anova, and Paired Samples T-tests were used to analyze HR drop during DAFI. One-way Manova explored differences in apnea-trained athletes and controls (Alpha = 0.05). **Results.** During every apnea, the HR of the entire group dropped compared to the HR plateau (48±15 bpm, $p<0.001$ for every apnea). Only few differences were found between both subgroups. **Conclusion.** The bradycardia during DAFI, suggests that the parasympathetic stimulus overrules the sympathetic stimulus caused by cycling[2]. This can be explained by the evolutionary O_2-conserving effect of DR. No differences in HR drop were found between apnea-trained and non-apnea trained subjects. Yet, the apnea-trained group had a significantly longer maximal BHT and a longer sustained apnea during cycling.

Table 1. Heart rate drop and apnea time between apnea trained and non-apnea trained. ($\bar{x}$±SD)

	Apnea trained	Non-apnea trained	*p*-value
Heart rate drop (beats)	50 ± 11	45 ± 10	0.307
Maximal static apnea time (s)	161 ± 29	113.39 ± 39	0.005
Sustained dynamic apnea time (s)	30 ± 0	24 ± 5	0.002

References:
[1] Cunnane, S. C. (1980). *Medical hypotheses, 6(1),* 49-58.
[2] Schagatay, E. (2010). *Diving Hyperb. Med.* 40, 11–22.

Intensity and periodization in plyometric training: Is there an optimal protocol?

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Purpose. To compare three periodization models of plyometric training with an equal training load (intensity*volume) and establish the optimal protocol in plyometric training to enhance speed, agility and jumping performance.

Methods. A selected group of 38 recreationally trained young men were randomly assigned to three different protocols. In Group 1 (Mixed) volume was increased while the mix of exercises remained the same. In Group 2 (LowHi) intensity was increased by changing the exercises from low to high intensity. In Group 3 (Low) volume was increased with no change in exercises. All three protocols were conducted with an equal and increasing training load. Training sessions were given twice weekly during a period of 8 weeks. Participants were tested before and after the intervention program for 5m and 10m sprint, 5x10m shuttle run, squat jump (SJ), countermovement jump without (CMJ) and with arm swing (CMJa) and standing long jump (SLJ). Height and weight were measured at both times. Plyometric exercises were categorized as low and high intensity based on vertical ground reaction forces. Skippings, jumplunges, runjumps and 2leg low hurdle jumps were considered low intensity exercises, whereas depth drops and jumps (45cm), consecutive countermovement jumps and standing long jumps were categorized as high intensity exercises. Repeated Measures ANOVA was used to analyse the differences between the three experimental groups.

Results. Following 8 weeks of training 5m ($p=0.355$: 0.06 ±7.7%, 1.84 ± 4.6%, 0.89 ± 3.67%) and 10m ($p=0.073$: -2.12 ± 4.14%, -0.48 ± 3.42%, -1.24 ± 2.71%) did not significantly change for respectively Mixed, LowHi and Low training groups. SR ($p=0.001$: 1.09 ± 2.6%, 3.37 ± 2.87%, 1.44 ± 4.02%), SJ ($p<0.001$: 7 ± 9.54%, 11.64 ± 7.93%, 5.37 ± 5.66%), CMJ ($p<0.001$: 6.6 ± 7.48%, 9.81 ± 8.52%, 4.32 ± 8.1%), CMJa ($p=0.001$: 3.32 ± 8.39%, 7.07 ± 8.52%, 5.02 ± 7.43%) and SLJ ($p<0.001$: 8.86 ± 10.4%, 7.25 ± 4.86%, 4.36 ± 5.75%) improved for respectively Mix, LowHi and Low with no differences between groups.

Tentative conclusion. So far, a significant enhancement in jumping power and agility was measured in all three groups. Speed tests were not significantly changed. Between groups, no significant differences occurred.

Gross motor coordination in Belgian elite youth soccer players: A comparison of performance against the original and more recent reference values of the Körperkoordinationstest für Kinder

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Gross motor coordination (GMC, i.e. body segments working together in goal-directed movement) is an important feature for being a successful youth soccer player. To assess the usefulness of GMC in the identification of talented players, the present study compared Belgian elite youth soccer players' level of GMC with that of the original 1974 German[1] and more recent 2008 Flemish[2] reference populations for the KörperkoordinationsTest für Kinder (KTK)[1]. Additionally, the effect of age category, maturity status (i.e. earlier, average or later maturing) and birth quarter (BQ) on GMC was studied. Subjects (N=345) were elite level players of the U10 to U12 age categories. Players performed three subtests of the KTK test battery: balancing backwards (BB), moving sideways (MS), and jumping sideways (JS). Performances on the subtests were normalized into age specific motor quotient (MQ) scores and a KTK3 sum score was calculated. Our sample of elite youth soccer players significantly outperformed the 1974 German sample (P<0.001-0.006) and the 2008 Flemish sample (P<0.001) on the total KTK3 score and subtest MQs. Differences between the applied reference values were affected by age. In each age category, applying the Flemish reference values resulted in higher KTK3 scores than applying the German ones (P<0.001). Similar results were found for MQ scores of the subtests (P<0.001), except for JS for which it was vice versa. Maturity status and BQ did not affected the performance on the KTK test. Our results suggest that elite soccer players have a "good" to "high" level of GMC compared to both a 1974 and a 2008 reference sample, suggesting that it is a useful talent identification factor in youth elite soccer. However, depending on the reference values used, scores and perceptions of GMC will vary. This raises the question if reference values are useful in this context compared to using raw scores and applying age-specific percentile scales.

References:

[1] Kiphard, E. J., & Schilling, F. (2007). *Körperkoordinationstest für Kinder. 2. Überarbeitete und ergänzte Auflag*. Weinheim: Beltz Test GmbH.

[2] Vandorpe, B., et al. (2011). The KörperkoordinationsTest für Kinder: reference values andsuitability for 6–12-year-old children in Flanders. *Scand J Med Sci Sports*, 21(3), 378–388

Non-surgical interventions for hyperkyphosis in older adults: A systematic review and meta-analysis

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Objective. To examine the clinical efficacy of different types of non-surgical treatments (including exercise programs, manual therapy, taping and orthoses) on the kyphotic posture of older adults.

Methodology. PubMed, Web of Science and Cochrane Library were systematically screened for RCT's. Participants had to be 50 years or older with hyperkyphosis. Data of eligible studies was extracted systematically and the risk of bias (RoB) was assessed. Studies with RoB scores above average were considered 'best-evidence'. Additionally, a meta-analysis was performed.

Results. Ten studies (593 participants) met the inclusion criteria and six were included in the meta-analysis. The following interventions were investigated: exercise (n=6), orthoses (n=2), combined treatment (n=2). Treatment modalities (e.g. duration, frequency, intensity) differ greatly between the studies. Four studies were considered as 'best-evidence'. The meta-analysis showed a significant effect on the kyphotic angle in favor of the experimental interventions (pooled effect size: -7.22°; 95%CI [-10.17, -4.27], I^2=76%, p=.0003). Subgroup analyses showed that 'risk of bias' but not treatment is a possible explanation for the high between-study heterogeneity: -4.18° (95%CI [-5.94, -2.42], I^2=14%, p=.31) for the best-evidence subgroup and -9.69° (95%CI [-12.49, -6.89], I^2=33%, p=.21) for the remaining studies.

Conclusion. This review shows that non-surgical therapeutic interventions such as exercise and orthoses should be considered to reduce hyperkyphosis in older people. Future research is needed to define the optimal modalities of these interventions.

Effect of a minimalist running technique training on running pattern and running related injury in adult novice recreational joggers: A controlled study

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Background. In contrast with common belief, the amount of injuries among people who use cushioned shoes is not significantly lower as compared to barefoot runners or minimalist shoe users (Van Gent et al. 2007). The aim of this controlled study is to evaluate the benefits of combining a less aggressive running technique with a cushioned shoe.

Methods. Thirty-one adult novice recreational joggers (mean age: 34, SD 13, years; 8 males) were recruited for a 12-week intervention: 16 in the intervention or "minimalist" group (group M) and 15 in the control group. In group M, the intervention consisted of one regular jogging session and one minimalist running technique training per week. The control group completed two regular jogging sessions a week. Ankle angle, knee angle and foot strike pattern at initial contact were measured together with step length and injury rate, for both groups at the start and at the end of the intervention. An ANOVA test was used to compare joint angles as well as step length between groups and moments. In case of significance, LSD test (Post Hoc) was used. Foot strike pattern and injuries were compared between groups by Chi² or Fisher Exact Probability. The level of significance was set at $p<0.05$.

Results. No significant changes in foot strike or ankle joint angle were found. Knee angle significantly decreased for group M ($p<0.02$). Step length significantly increased for both groups ($p<0.0001$). No significant difference in amount of injuries was found. However, certain differences in injury sites were observed between groups.

Conclusion. Although a 12-week intervention might be too short for sufficient adaptation, some interesting preliminary results were found in terms of injury sites and increased knee flexion at initial contact in group M. Two subjects of group M changed their technique to a minimalist one, with more flexed knee, plantar flexed ankle and front foot strike at initial contact while 2 other subjects ran with a technique, leaning towards a more minimalist one. Despite a limited adaptation of running technique in the group M, the differences in injury distribution are promising.

Reference:

Van Gent, R.N., Siem, D., van Middelkoop, M., van Os, A.G., Bierma-Zeinstra, S.M. & Koes, B.W., 2007. Incidence and determinants of lower extremity running injuries in long distance runners: A systematic review. British Journal of Sports Medicine, 40(4): 16-29.

Hyperkyphosis as a predictor of negative health outcomes in older adults: A systematic review

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Objectives. Cross-sectional studies suggest that hyperkyphosis is associated with negative health outcomes. A systematic review of prospective studies has not been published yet. The aim of this study is to provide an overview of studies investigating the influence of hyperkyphosis on future negative health outcomes. **Methods.** We performed a literature search (Pubmed, Web of Science, Cochrane library) for studies examining the effect of hyperkyphosis on negative health outcomes. Two blinded reviewers screened independently for eligible studies. Risk of bias was assessed by the 'Quality in prognostic studies' (QUIPS) tool. No meta-analyses were performed due to high between-study heterogeneity. **Results.** Nine articles (8487 participants) were included. Two studies had one or more domains with high risk of bias. The age of the participants ranged between 25 and 98 years. Thoracic kyphosis was measured with different methods: flexicurve, radiography, occiput-to-table distance and kyphometer. Follow-up periods ranged between 50 and 180 months. The following negative health consequences were reported: mortality (n=5), fractures (n=2), functional decline (n=2) and respiratory complications (n=1). Elderly with hyperkyphosis have a greater rate of mortality (HR=1.40 (95%CI[1.08-1.81], p=.012). In addition, women have an increased risk of future osteoporotic fractures over the next four years (OR=1.92, 95%CI[1.13,3.28]). A kyphotic posture was negatively associated with mobility performance and there were significant negative associations for forced vital capacity and forced expiratory volume in one second. **Conclusion.** Hyperkyphosis predicts several future negative health outcomes. Hence, more research regarding the long-term effects of therapeutic interventions for hyperkyphosis on these negative health outcomes is justified.

The current use of pain education in pediatric chronic pain: Protocol of a systematic literature review

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Objective. Current treatment for adults with chronic pain often includes pain neuroscience education to make patients understand the nature underlying their pain. Pain neuroscience education has shown to be effective in changing pain beliefs of a patient and improving their pain coping strategies and health status. Little is known about the use and any type of education about pain in the context of pediatric chronic pain. Therefore, the objective of this review is (1) to determine the different formats of pain education in this particular population and (2) to examine their efficacy.

Design. Systematic literature review

Methods. The literature search will be carried out by using the electronic databases PubMed and Web of Science and will be based on a combination of keywords and MESH terms according the "PICO" method: (P) pediatric chronic pain patients (aged 0-18 years old), (I) any pain education format and (O) any pain-related outcome. No restrictions will be set for the search with respect to publication year, but only studies in English or Dutch will be included. Two researchers will independently screen the titles and abstracts of all identified articles using the Rayyan web application (https://rayyan.qcri.org). Data extraction and methodological quality assessment will be carried out independently using the STROBE guidelines and GRADE approach for the synthesis of the evidence. Any disagreements that arise between the reviewers will be resolved through discussion, or by consulting a third researcher.

Discussion. This study will be the first systematic literature review examining the use of pain education in pediatric chronic pain. Findings of this study will reveal the current existing pain education formats for pediatric patients with chronic pain.

Hysteresis effects in rope skipping coordination dynamics

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In this study, we demonstrate hysteresis effects in the coordination dynamics of rope skipping. Five semi-professional rope skippers were instructed to perform a 60-seconds continuous forward basic bounce step at a metronome-paced frequency. During the first 30-s, we linearly increased the jumping frequency between the minimum and maximum frequency of every subject. During the second half we reversed the direction back to the minimum frequency. This task was performed two times. A 6-camera 3D motion analysis system was used to capture the three-dimensional kinematics throughout the task to calculate the joint angles and angular velocities of 13 degrees of freedom from the entire body. Self-Organizing Maps (SOMs), a specific type of artificial neural network, were used to study the multi-dimensional coordination. The aim of the SOM is to transform the multi-dimensional data related to the rope skipping topologically to a two dimensional discrete map. The two-dimensional coordinates of the best-matching unit (BMU)-trajectories per jump in this new space are used to train a second, 1-dimensional SOM: our order parameter describing the coordination pattern. This order parameter was calculated per jump cycle and was plotted against the jumping frequency (control parameter) to qualitatively analyze hysteresis effects (see Fig. 1). Hysteresis effects were visible for nearly all trials, thus demonstrating that bi-stable coordination patterns exist during certain ranges of the control parameter, although the mode in which the hysteresis emerges was very different between subjects (a phase transition was seen either before the instability or in the unstable region, while other trials show hysteresis without a clear phase transition). Moreover this study shows that the approach with Self-Organizing Maps is an attractive tool to analyze coordination dynamics of systems with a high number of degrees of freedom like in a rope skipping task which comprises both upper and lower limbs in synchrony.

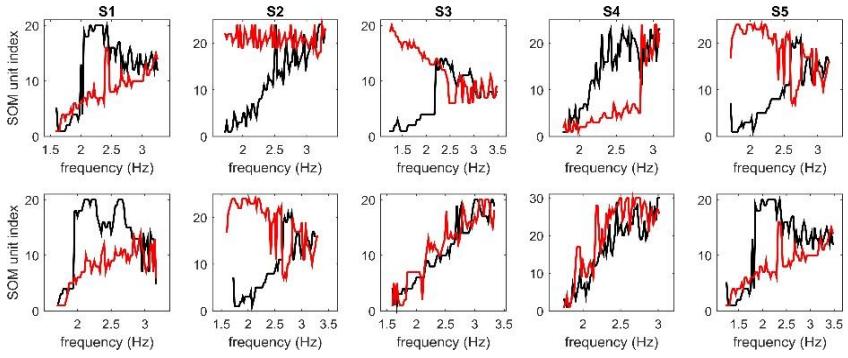

***Fig. 1**: hysteresis plots. The black lines represent the coordination states during the first 30 seconds (increasing frequency), the red lines the second 30 seconds (decreasing frequency). S1-S5: five subjects, rows represent the two trials.*

The effect of a portion size intervention on French fries consumption, satiety and caloric intake: An on-campus restaurant experiment

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One of the driving factors of dietary overconsumption throughout the last decennia is the enlargement of food portion sizes. It is documented that larger portions induce higher energy intake at the end of the day. Hence, it could be argued that reducing portion sizes may protect people against excessive caloric intakes. However, real-life studies about the effects of portion size reduction are lacking. Therefore, this study examined the effect of a French fries portion size reduction on French fries consumption, French fries plate waste, satiety and caloric intake during the subsequent afternoon among university students and employees in a Belgian on-campus restaurant setting. Moreover, this study evaluated consumers' perception about the portion size reduction. French fries portion size was reduced by 20% through replacing the usual porcelain bowl (containing ±200g of French fries (baseline week)) by smaller volume paper bags during the intervention week (containing ±160g of French fries). French fries consumption and plate waste were measured during both conditions. A subsample of consumers were interviewed directly after completing their lunch and between 4 and 6 p.m. on the same day about their satiety and caloric intake. After the intervention week, the same subsample was interviewed about their perception of the portion size reduction. Total French fries intake decreased significantly by 9.1%, whereas total waste decreased significantly by 66.4%. No significant differences were found in satiety or caloric intake between the two conditions among both French fries and non-French fries consumers. Most of the French fries consumers (86%) noticed the reduced portion size during the intervention. Although for most participants (68%) the reduced portion size was sufficient, only a minority of participants (32%) indicated they would agree with a permanent implementation. Changing portion size is a relatively easy and promising environmental strategy which may lead to more balanced/healthier food intake.

Gaze behaviour during daily tasks in young adults with Developmental Coordination Disorder

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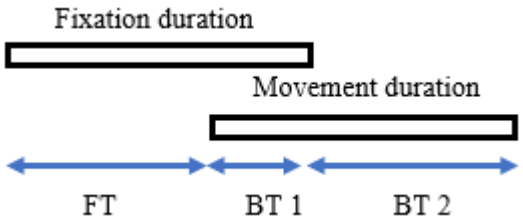
Individuals with developmental coordination disorder (DCD) experience difficulty in the coordination and execution of motor tasks. These deficiencies cannot be explained by any intellectual visual or neurological impairment and so the etiology of the disorder remains unclear. A number of researchers found differences in oculomotor behaviour between children with DCD and typically developing children. These differences appear to lead to impaired eye-hand coordination and eventually slower and less accurate movements in laboratory tasks. The aim of this study was to explore the differences in gaze behaviour in individuals with DCD during daily tasks. Therefore, six young adults with DCD and six typically developed (TD) young adults performed a stacking task in which they had to pile up three cups in the middle of the table while wearing eye tracking glasses. In line with our expectations we found that individuals with DCD had slower movement execution compared to TD subjects and their fixations were less stable. Positive foveation times (FT, *see figure*) indicated that almost each movement was preceded by a fixation to the same target (average duration across groups = 109,59 ms; SD = 53,50 ms). In contrast with previous findings, we found no differences between the groups for this variable, which suggests that individuals with DCD do not need more time and/or visual information to start their action compared to TD individuals for this task. Considering buffer time 1 (BT 1, *see figure*), all individuals had negative mean values indicating that the hand always started to move to a target before the gaze shifted to a consecutive target. This means that no information needed to be buffered or temporarily saved. The absolute values of BT1 tend to be larger in individuals with DCD, suggesting that they postpone the saccade towards the following target of a sequence longer than controls. The within and between group variability of buffer time 2 (BT 2, *see figure*) appeared to be very large indicating inconsistent coupling between eye and hand on this parameter. In summary, the results of this study are consistent with previous research, except for foveation time. We conclude that slower execution of action in daily tasks might be due to differences in oculomotor behaviour in young adults with DCD, though further research on larger samples is required.



Vrije bijdrages:

POSTER PRESENTATIES

Elke onderzoeker, die niet langer als master- of PhD student aan de slag is, krijgt eveneens de gelegenheid om zijn/haar onderzoek aan de hand van een poster te presenteren. Aangezien het een vrije bijdrage betreft, is hier geen wedstrijd aan verbonden. Alle deelnemers aan het VK symposium kunnen deze posters eveneens aandoen tijdens de posterwandeling.

Dit jaar ontvingen we een inzending van onderstaande collega's:

- Evi Verbecque & An Hallemans (UAntwerpen)

Het zelfbeeld bij Antwerpse kleuters die leven in generatiearmoede

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Doelstelling. Armoede is een actueel onderwerp in onze samenleving omdat het een groeiend probleem is [1]. Bij kinderen heeft armoede een negatieve invloed op het zelfbeeld. Het doel van deze studie was om te onderzoeken of een bewegingsschool een positief effect heeft op het zelfbeeld bij kleuters die leven in generatiearmoede.

Methode. Vijf kleuters (3-5 jaar oud) namen deel aan een bewegingsschool (7 bewegingslessen; 60 minuten/les; 1x/2 weken), waarbij alle basisvaardigheden van het motorisch functioneren geoefend werden. Het zelfbeeld werd beoordeeld met de Pictoral Scale of Perceived Competence and Social Acceptance (PSPCSA), bestaande uit vier subschalen: de cognitieve en fysieke competentie en de groeps- en maternale acceptatie [2]. De schaal werd afgenomen *voor aanvang van de bewegingsschool* (T0), *na beëindiging* (T1) en *3 maanden na beëindiging* (T2). Met de Wilcoxon Signed Rank Test werden verschillen in mediaanwaarden op de subschalen op T0, T1 en T2 beoordeeld. Om het zelfbeeld van kleuters in generatie-armoede te kaderen, werden hun prestaties vergeleken met PSPCSA-referentiewaarden uit de literatuur, ingedeeld op basis van socio-economische status (SES).

Resultaten. De mediaanwaarden van de PSPCSA-subschalen lagen steeds lager bij kinderen in generatiearmoede dan de beschikbare literatuurgegevens, ongeacht de SES. De bewegingsschool resulteerde voor geen enkele subschaal in een statistisch significante verbetering van het zelfbeeld ($T0<T1$, $T1\leq T2$, $T0<T2$: $p>0.05$).

Conclusie. Het zelfbeeld van kleuters in generatiearmoede is zwakker dan literatuurgegevens. Ondanks de positieve trend, verbeterde de huidige bewegingsschool het zelfbeeld niet significant. Vermoedelijk spelen de kleine steekproef alsook de frequentie van de bewegingslessen hierin een rol.

Referenties:

[1] Kind en Gezin. (2014). Het kind in Vlaanderen.

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