

Deficits in neurocognitive performance in patients with CAI performing a dynamic balance task.

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Vereniging voor Bewegings- en Sportwetenschappen



27^e Symposium
16 december 2022
– KU Leuven –

VOORWOORD

Beste collega bewegings- en sportwetenschapper,

Na twee COVID-19 edities, die we noodgedwongen online moesten laten plaatsvinden, zijn we met de Raad Van Bestuur van de Vereniging voor Bewegings- en Sportwetenschappen verheugd jullie dit jaar terug in levende lijve te kunnen verwelkomen in Leuven en dit voor de 27^e editie van ons symposium. Hoewel die vorige digitale edities zeker ook geslaagd waren met heel sterke presentaties, ben ik ervan overtuigd dat een live editie veel beter geschikt is om de belangrijkste doelstelling van de vereniging te realiseren: het stimuleren van interactie tussen onderzoekers binnen het brede gebied van de bewegings- en sportwetenschappen die actief zijn in Vlaanderen. Toen we dan ook ergens in juni dit jaar de knoop moesten doorhakken of we live, digitaal of hybride zouden organiseren, was de beslissing snel genomen.

Het concept van ons symposium, waarbij we volop jonge onderzoekers aan het woord laten, hebben we behouden. We hebben weer 12 onderzoekers geselecteerd die mondeling hun onderzoek zullen presenteren in de Gaston Beunen prijs aangevuld met posterpresentaties van zowel PhD- als Masterstudenten. Voor veel onderzoekers is dit symposium het eerste evenement waarop ze hun werk voor een breed publiek brengen, buiten hun eigen universitaire context. Hoewel dit wel wat stress met zich mee zal brengen, willen we het symposium vooral laagdrempelig houden en focussen op de positieve interactie en feedback van peers. Dus aan de jonge onderzoekers: laat jullie niet van de wijs brengen door de éminences grises die hier rondlopen... Die zijn ook ooit begonnen waar jullie nu staan.

Ik wil ook het organisatiecomité van de KU Leuven bedanken. Uit ervaring weet ik dat de organisatie van een symposium als dit, veel voeten in de aarde heeft. Bovendien moet dit gebeuren naast de al drukke agenda vol met onderwijs en onderzoek. We werken dan wel met een turnus waarbij elke universiteit om de beurt aan bod komt als host, elke keer is het toch even 'vloeken als je weer zelf moet organiseren. Martine, Peter, Pieter-Jan en Laurens, bedankt voor jullie engagement en om deze editie mogelijk te maken.

Afgaande op het programma, hebben we een interessante wetenschapsdag voor de boeg. Maar even belangrijk als de eigenlijke sessies zijn de pauzes en afsluitende receptie: Het moment bij uitstek om elkaar te ontmoeten, onderzoekservaringen te delen of om gewoon wat bij te praten. Veel plezier!

Jan Boone

Voorzitter Vereniging voor Bewegings- en Sportwetenschappen.

INTERACTIEF PROGRAMMA 27^{ste} VBSW SYMPOSIUM

Klik op de presentatie om naar het bijhorend abstract te gaan

08u30 – 09u00 **Registratie** en welkom (Aula, Gebouw De Nayer)

09u00 – 09u10 **Verwelkoming** door VBSW-voorzitter Jan Boone

09u10 – 09u50 **Gastlezing 1:** Veerle Segers (UGent) – "A biomechanical perspective on injury-free recreational running (4 health)"

09u50 – 10u35 **Mondelinge presentaties I (Gaston Beunen prijs) – 3 sprekers**

09u50 *Freek Van de Castele (UGent) – "Muscle fiber typology in national level football and its influence on in-game fatigue"*

10u05 *Elisa Lefever (UGent) – "Does a closer coach-athlete bond buffer or exacerbate the detrimental effects of controlling coaching on athletes' coping and outcomes?"*

10u20 *Nathan D'Hoore (KU Leuven) – "Sports federations, social policy and the process of decolonization in Flanders"*

10u35 – 10u50 **Koffiepauze** + Poster ophangen

10u50 – 12u05 **Mondelinge presentaties II (Gaston Beunen prijs) – 5 sprekers**

10u50 *Kim Van Vossel (UGent) – "Influence of muscle fiber typology on hypertrophy and dynamic strength gains after 10 weeks of resistance training to failure"*

11u05 *Alexandre Maricot (VUB) – "Deficits in neurocognitive performance in patients with chronic ankle instability performing a dynamic balance task."*

11u20 *Kian Vanluyten (KU Leuven) – "Inclusion in physical education during a parkour unit in elementary: a descriptive study for five children with ASD"*

11u35 *Alexia van de Loock (UGent) – "H1-, but not H2-antihistamine intake blunts muscle glycogen resynthesis after interval exercise"*

11u50 *Matthijs Michiels (KU Leuven) – "Effect of resistance training on HbA1c and other cardiovascular risk factors in patients with type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials"*

12u05 – 12u40 **Broodjeslunch**

12u40 – 13u40 **Posterwandeling** – jurering Master- & PhD-bijdrages

Post-doc-bijdrages

Colosio Alessandro (UGent)
De Clerck Tom (UGent)
Jaspers Arne (KU Leuven)
Latomme Julie (UGent)
Laureys Felien (UGent)
Versele Vickà (VUB)

PhD-bijdrages

De Bleecker Camilla (UGent)
De Block Fien (UGent)
Decorte Elise (KU Leuven)
D'Hondt Joachim (VUB)
Hardeel Julie (UGent)
Iliano Evelien (UGent)
Mertens Lisa (VUB & UGent)
Quiroz Marnef Arturo (VUB)
Vansweevelt Nina (KU Leuven)
Zhang Tonghe (KU Leuven)

Master-bijdrages

Bosmans Jana (KU Leuven)
Claeys Reinhard & Saey Ian (KU Leuven)
Corluy Hortense (VUB)
Deboutte Jolien & de Lange Elsa (KU Leuven)
Deroost Frea & Petrella Davide (KU Leuven)
Devos Florence (KU Leuven)
Engelborghs Sofie & Vandeput (KU Leuven)
Heemels Robin (KU Leuven)
Janssens Carlo (UGent)
Lepplae Jef & Vananderoye Casper (KU Leuven)

Maes Sylke (KU Leuven)
Roth Zachary (KU Leuven)
Samyn Linde & Van Dael Kaat (KU Leuven)
Schampheleer Emilie (VUB)
Van Belleghem Karel (UGent)
Van Caekenberghe Wouter (KU Leuven)
Van Dyck Matthew (UGent)
Vermeulen Lander (KU Leuven)

13u40 – 14u20 **Gastlezing 2:** Mike McNamee (KU Leuven) – "A Sport Related Concussion Research Agenda Beyond Medical Science: culture, ethics, science, policy"

14u20 – 14u50 **Mondelinge presentaties III (Gaston Beunen prijs) – 2 sprekers**

14u20

Stefan Vermeulen (UGent) – "Fatigue reduces patellar tendon loading in healthy volleyball players"

14u35

Pauline Hotterbeex (KU Leuven & UGent) – "Walk your brain: a two-phased pilot study of a cognitively enriched walking program."

14u50 – 15u05 **Koffiepauze**

15u05 – 15u35 **Mondelinge presentaties IV (Gaston Beunen prijs) – 2 sprekers**

15u05

Ruben Robberechts (KU Leuven) – "Exogenous ketosis improves sleep efficiency and counteracts the decline in REM sleep following strenuous exercise"

15u20

Marie Vermote (VUB) – "Healthy Grandparenting Project: Differences in levels of physical activity and sedentary behaviour as well as body composition between caregiving grandparents, non-caregiving grandparents and non-grandparents"

15u35 – 16u00 **Stemming** Publieksprijs en Bekendmaking Gaston Beunen prijzen **Algemene ledenvergadering** door Jan Boone (voorzitter VBSW)

16u00 – 17u00 **Receptie**

SPONSORS 27^e SYMPOSIUM



GASTLEZING 1: Veerle Segers (UGent)

"A biomechanical perspective on injury-free recreational running (4 health)"

In deze lezing wordt vanuit een theoretisch biomechanisch perspectief gekeken naar de voordelen en nadelen van lopen. Hierin zal dieper ingegaan worden op loopstijlaanpassingen en strategieën om de interne belasting te verlagen om zo te kunnen blijven genieten van de voordelen van lopen op (bijna) alle leeftijden.

GASTLEZING 2: Mike McNamee (KU Leuven)

"A Sport Related Concussion Research Agenda Beyond Medical Science: culture, ethics, science, policy"

The Concussion in Sport Group guidelines have successfully brought the attention of brain injuries to the global medical and sport research communities, and has significantly impacted brain injury-related practices and rules of international sport. Despite being the global repository of state-of-the-art science, diagnostic tools, and guides to clinical practice, the ensuing Consensus Statements remain the object of ethical and socio-cultural criticism. The purpose of this talk is to bring to bear a broad range of multidisciplinary challenges to the processes and products of sport related concussion movement. We identify lacunae in scientific research and clinical guidance in relation to age, disability, gender, and race. We also identify, through multi- and interdisciplinary analysis, a range of ethical problems resulting from conflicts of interest, processes of attributing expertise in sport-related concussion, unjustifiably narrow methodological control, and insufficient athlete engagement in research and policy development. We argue that the sport and exercise medicine community need to augment the existing research and practice foci to understand these problems more holistically and, in turn, provide guidance and recommendations that help sport clinicians better care for brain-injured athletes.

McNamee, M.J., Anderson, L., Borry, P., Camporesi, S., Derman, W., Holm, S., Knox, T., Leuridan, B., Loland, S., Frias, J.F., Lorusso, L. Malcolm. D., McArdle, D., Partridge, B., Schneider, K., Schramme, T., Weed, M.

DEEL I – Mondelinge presentaties

Gaston Beunenprijs

Alle jonge onderzoekers die hun doctoraat nog niet verdedigd hebben, kunnen deelnemen aan deze mondelinge presentatiewedstrijd. De jury selecteerde vooraf uit de ingezonden abstracts maximaal twaalf mondelinge presentaties. De kandidaten krijgen tien minuten tijd om hun werk te presenteren waarna er gedurende vijf minuten vragen gesteld kunnen worden door de jury. De winnaar van deze wedstrijd krijgt een prijs van 150 euro, terwijl de als tweede en derde gerangschikte studenten geproclameerd worden.

Dit jaar zijn de volgende deelnemers geselecteerd:

Freek Van de Castele (UGent)

Elisa Lefever (UGent)

Nathan D'Hoore (KU Leuven)

Kim Van Vossel (UGent)

Alexandre Maricot (VUB)

Kian Vanluyten (KU Leuven)

Alexia van de Loock (UGent)

Matthijs Michiels (KU Leuven)

Stefan Vermeulen (UGent)

Pauline Hotterbeex (KU Leuven & UGent)

Ruben Robberechts (KU Leuven)

Marie Vermote (VUB)

Muscle fiber typology in national level football and its influence on in-game fatigue

Van de Castele Freek¹, Lievens Eline¹, Van Vossel Kim¹, Hardeel Julie¹, Derave Wim¹

(1) Ghent University

Introduction: Physical demands in football (soccer) are position-dependent and a large heterogeneity in muscle fiber typology exists among national level players. Furthermore, fast typology individuals (FT) fatigue more than slow typology individuals (ST) during high-intensity exercise in lab conditions. Therefore, we investigated if muscle typology is different between positions and if FT experience more in-game fatigue than ST.

Methods: Muscle typology was estimated in 146 male professional football players (24.7±4.8yr) by measuring soleus muscle carnosine via proton magnetic resonance spectroscopy. Players were classified as ST, intermediate typology individuals (IT) or FT. Our sample comprised 17 goalkeepers, 27 center-backs, 20 full-backs, 45 midfielders, 20 wingers and 18 forwards. During 4 seasons in-game distances covered in multiple running speed, acceleration and deceleration zones were collected by a multi-camera system. Fatigue was defined as the decay in running activities from the 1st to 2nd half. Player values were adjusted for playtime and game averages were calculated, but only for the 66 outfield players who completed ≥5 games with ≥75 min playtime. ANOVAs were used to determine differences in muscle typology between positions and differences in distances covered between typology groups.

Results: There were no differences in muscle typology between positions ($p=0.412$). FT covered 10.9% more high acceleration distance ($>3\text{m/s}^2$) in the 1st half than ST ($p=0.021$) and high acceleration distance decay was larger for FT (-12.4%) than ST (-7.7%; $p=0.006$) and IT (-7.3%; $p=0.01$). Moreover, the decline in distance covered in several high-intensity zones tended to be larger in FT (-11.2% high-intensity $>15\text{km/h}$; -12.7% high deceleration $<-3\text{m/s}^2$; -11.5% medium acceleration $2-3\text{m/s}^2$) than in ST (-7.1% high-intensity; -8.1% high deceleration; -8.1% medium acceleration; $0.05 < p < 0.1$).

Conclusion: Possessing a particular muscle typology is not required to play any football position at the national level. However, there are indications that FT are worse at maintaining high-intensity performance in the 2nd half compared to ST.

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Does a closer coach-athlete bond buffer or exacerbate the detrimental effects of controlling coaching on athletes' coping and outcomes?

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(1) Department of Movement and Sport Sciences, Ghent University, Belgium; (2) Department of Developmental, Personality and Social Psychology, Ghent University, Belgium; (3) Department of Sport Science and Clinical Biomechanics, University of Southern Denmark, Denmark; (4) School of Health and Welfare, Halmstad University, Sweden; (5) School of Education and Lifelong Learning, University of East Anglia, United Kingdom.

Introduction: Although the detrimental effects of a controlling coaching style on athletes' mental health have been widely demonstrated, many coaches still rely on such a style, hoping to push athletes towards exceptional performances. Some coaches are convinced that, if they simultaneously adopt a warm and relatedness-supportive approach, their controlling practices will not yield detrimental effects on their athletes. Based on the Self-Determination Theory and Skinner's coping framework, this study examined whether these coaches' convictions hold true.

Methods: A total of 203 volleyball players (67% female; age = 21.20 ± 4.67 years) completed assessments of perceived controlling and relatedness-supportive coaching styles, their coping strategies (accommodation, compulsive compliance), and their self-reported engagement, performance, competitive anxiety, and burn-out.

Results: Results showed that athletes who perceived their coach as more controlling, reported reduced performance, and higher levels of competitive anxiety and burn-out. Relatedness support exaggerated the detrimental effects of a controlling coaching approach. At higher levels of relatedness support the relation between controlling coaching and compulsive compliance (i.e., a maladaptive coping strategy) became stronger. This in turn yielded a more detrimental pattern of outcomes including reduced performance and higher levels of anxiety and burnout.

Conclusion: The combination of a controlling and relatedness-supportive coaching style relates to more undesirable outcomes, such as more maladaptive coping through compulsive compliance, and in turn worse performance, and mental well-being as measured by athletes' feelings of anxiety and burnout. It thus seems better to not use a controlling coaching style, than trying to counteract the detrimental effects by also investing in a warm and caring bond.

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Sports federations, social policy and the process of decolonization in Flanders

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Introduction: Sports federations in Flanders are mediators between the government and the local sports clubs. They, as part of the so-called civil society, translate the decrees into concrete guidelines for the clubs. These guidelines emphasize the social significance of clubs and stimulate projects with broader social-cultural objectives. However, the instrumental use of sport for social objectives is a colonial phenomenon. Imperial powers took sports to other parts of the world in order to civilize the 'uncivilized'. Although social scientists have drawn attention to the enduring impact of colonial structures on the global sport-scape, social sport policy has largely neglected this. Therefore, this research aims to examine whether it is legitimate to speak about an imperial legacy in contemporary social sport policy in Flemish sports federations.

Methods: This research draws upon an online survey (the Flemish Sports Federation Panel 4.0) and semi-structured interviews with board members of Flemish sports federations. The survey (N = 38) explored the federations' perceived role and motivations of social objectives. In the interviews (N = 18), the federations were asked about specific initiatives, the ideology and the added value of these policies.

Results: While sponsorship changed significantly, preliminary results show that power structures and mentalities about different population groups in social sport policy remain subject to imperial legacy. Federations, dominated by white males, appropriate a civilizing role out of compassionate concern for those in need. Moreover, sports programmes and initiatives – perceived as a level playing field – reflects western cultural hegemony through two-way but imbalanced initiatives.

Conclusion: Ideas, ideologies, and structures of social sports policies introduced during colonial times are largely preserved for the greater purpose of increasing the well-being of the population. Decolonization through, among other things, diversification of social sport policy seems essential to deconstruct dominant narratives and provide new insights.

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Influence of muscle fiber typology on hypertrophy and dynamic strength gains after 10 weeks of resistance training to failure

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Introduction: Considerable heterogeneity exists in the adaptations to resistance training. We investigated if the high variability in muscle fiber typology between humans is one of the missing elements in understanding this heterogeneity and if different training frequencies and volumes cause different training responses in slow typology (ST) and fast typology individuals (FT).

Methods: Eleven untrained ST (6 men) and 10 FT (5 men) performed 10 weeks of leg extensions, leg curls, biceps curls and triceps extensions to failure (3-4 sets/training, 60%1RM). Muscle typology was estimated by measuring leg muscle carnosine with proton magnetic resonance spectroscopy. A within-subject design was used: leg and arm A trained 3x/week, leg and arm B 2x/week. Muscle hypertrophy (MRI), dynamic strength (1RM) and fiber type specific hypertrophy (vastus lateralis biopsies) were measured before and after the training period. Independent Samples t-tests and two-way RM ANCOVAs were used to detect differences between ST-FT and 3x-2x/week condition.

Results: Individual changes in muscle volume and strength ranged respectively from 0.1-11.4% and 4.2-43.8% (quadriceps), 2.1-23.1% and 6.7-90.0% (hamstrings), -0.6-15.8% and 5.9-116.7% (biceps) and 6.4- 25.5% and 21.4-150.0% (triceps). However, no significant differences were found between ST and FT in volume and strength changes, nor in the change in cross-sectional area of the type I and type II fibers. Total training volume was higher in ST compared to FT ($p=0.03$) but was not related to training adaptations. No interaction effect was found between muscle typology and training frequency.

Conclusion: The heterogeneous response in hypertrophy and dynamic strength seems independent of the muscle typology in untrained ST and FT. Total training volume to failure was lower in FT which might indicate that FT have more muscle response per repetition and can gain equal responses with less volume per training. Additionally, optimal resistance training frequency does not differ between ST and FT.

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Deficits in neurocognitive performance in patients with chronic ankle instability performing a dynamic balance task.

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(1) Faculty of Physical Education and Physiotherapy, Human Physiology and Sports Physiotherapy Research Group (MFYS), Vrije Universiteit Brussel

Introduction: Lateral ankle sprains (LASs) are the most common ankle injury with high reinjury rates. While most patients recover and become copers, around 40% develop persisting dysfunctions, including a feeling of giving-way, known as chronic ankle instability (CAI). Neural adaptations are put forward to clarify the aetiology and the chronic nature of CAI. As such, deficiencies in neurocognitive performance may influence incidence rates in musculoskeletal injuries. However, balance tests commonly used in clinical practice with applications in injury prevention and return to sport decision-making to gauge injury risk lack neurocognitive load. Hence, why we used the reactive balance test (RBT) to evaluate neurocognitive performance and balance ability in patients with CAI and healthy controls.

Methods: Twenty-seven patients with CAI (age 22±2) and 22 healthy controls (age 22±1) visited the lab twice; for a familiarisation trial and an experimental trial. The experimental trial consisted of an RBT performed on each leg once using the Fitlights system. Accuracy and visuomotor reaction time (VMRT) were recorded for each participant.

Results: Patients with CAI had lower accuracy than healthy controls (CON: 91.80%±5.16%), independent of side (CAI: 83.12%±8.04%, contralateral side: 81.48%±8.65%). There were no left-right differences in both groups for accuracy and VMRT. For VMRT alone, there were no significant differences between groups (CAI-CON: 776.03ms±107.77ms, 739.47ms±98.43ms, p=0.584).

Conclusion: The results of this study demonstrate that patients with CAI were significantly less accurate compared to healthy controls during a neurocognitive balance task. This accuracy reduction equates to a significantly lower neurocognitive performance whilst maintaining similar VMRTs. Based on these findings, neurocognitive stimuli should be added to rehabilitation programs for patients with CAI. Future research should investigate whether neurocognitive training can prevent lower limb injuries or enhance performance in sports where neurocognitive performance is relevant, such as table tennis, basketball or football.

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Inclusion in physical education during a parkour unit in elementary: a descriptive study for five children with ASD

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Introduction: Integrating children with disabilities in general physical education classes does not necessarily lead to full inclusion. Children with disabilities are often less physically active and less motor skilled, which might negatively impact these children's learning in physical education. The purpose of this study was to compare physical activity levels and motor skill trials of children with and without autism spectrum disorder (ASD) in elementary schools.

Methods: Five 2nd grade elementary school children with ASD (eight-years old, two girls and three boys) from four different classes, containing 88 children, were taught a ten-lesson parkour unit. Moderate-to-vigorous physical activity (MVPA) and skill trials data were collected by trained observers through systematic observation. Moderate-to-vigorous physical activity and the percentage of successful skill trials were compared between children with and without ASD within classes.

Results: Children with ASD engaged in MVPA levels that were lower than class averages (typically developing peers) for 71% of lessons, with MVPA ranging between 18-53% (vs 21-59% MVPA for typically developing). For successful skill trials, children with ASD scored lower than their typically developing peers for 93% of time, with percentages successful skill trials ranging from 16-34% (vs 32-56% for their peers).

Conclusion: Physical activity levels and successful skill trials during physical education of children with ASD are mostly lower compared to children without ASD. A focus on student learning presents itself and can be addressed in teacher training. Further research should look into why these differences occur and how this can contribute to the full inclusion of children with ASD within general physical education classes.

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H1-, but not H2-antihistamine intake blunts muscle glycogen resynthesis after interval exercise

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Introduction: Intake of antihistamine medication during a 6-week cycling training period results in marked impairments in training adaptations. An underlying mechanism could be a blunted muscle glycogen resynthesis during recovery, since taking this medication reduces post-exercise skeletal muscle glucose and glycogen is the main energy source during interval exercise. Therefore, in the current study, we investigated the effect of H1- or H2-antihistamines on glycogen resynthesis during recovery from intense exercise in humans.

Methods: Fourteen healthy men and women performed a high-intensity interval training session on a cycling ergometer on 3 different days. Subjects ingested placebo (control), 540mg fexofenadine (H1-antihistamine) or 40mg famotidine (H2-antihistamine) 1 hour before the exercise bout. Muscle biopsy samples of the vastus lateralis were collected before exercise, after 0 and 3 hours of recovery. Muscle glycogen was measured spectrophotometrically after acid hydrolysis. The underlying mechanism was investigated by determining glycogen synthase activity.

Results: Before exercise, glycogen content was not different between control (520 mmol/kg), H1- (511 mmol/kg) or H2-antihistamines (474 mmol/kg)($p=0.47$). Glycogen depletion during exercise was also not different between placebo (-297 mmol/kg), H1- (-238 mmol/kg) or H2-antihistamines (-216 mmol/kg)($p=0.17$). During the 3h recovery period, glycogen resynthesis was lower with H1- (+25 mmol/kg, $p=0.02$), but not with H2-antihistamines (+67 mmol/kg, $p=0.74$) compared to placebo (+125 mmol/kg). Glycogen synthase activity was higher immediately after exercise (+57%, $p<0.001$) and after recovery (+100%, $p<0.001$) compared to before exercise, but was not different between the 3 conditions ($p>0.05$).

Conclusion: Intake of H1-antihistamines blunted glycogen resynthesis during recovery from interval exercise. This data suggests an important contribution of the histamine system to metabolic recovery of muscle from acute exercise, which does not seem to be mediated by glycogen synthase activity. A possible mechanism could be glucose and insulin delivery through sustained elevation of post-exercise muscle perfusion, which is blunted by antihistamine intake.

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Effect of resistance training on HbA1c and other cardiovascular risk factors in patients with type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials

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Introduction: Exercise therapy is recommended in the prevention and management of patients with T2DM. Recently, dynamic resistance training has attracted more interest as an exercise therapy in the management of patients with diabetes. Though, the primary outcome in these trials has mostly been glycated hemoglobin (HbA1c). Given the high prevalence of other CV risk factors in patients with T2DM, knowledge on the impact of dynamic resistance training on the overall CV risk profile of these patients is important.

Methods and analyses: A systematic search was conducted on four electronic databases, from the inception to the first of September 2021 to identify peer reviewed randomized controlled trials investigating the effect of resistance training on HbA1C in adults with T2DM. Primary outcome was HbA1C. Secondary outcomes included traditional CV risk factors (i.e. blood pressure, blood lipids, body composition) and physical fitness (muscle strength, exercise capacity). Effect sizes were calculated using random effect models. Data are reported as weighted mean and 95% confidence limits.

Results: Fourteen trials could be included in the meta-analysis. Resistance training was found to significantly reduce HbA1c [-0.35 % (95% CL:-0.61 to -0.11)], systolic blood pressure [-4.6 mmHg (95%CL:-8.7 to -0.39)], diastolic blood pressure --2.25 (95%CL -4.45 to -0.048)) and body fat (-0.038). Muscle strength was significantly improved in the three studies reporting this outcome. Other cardiovascular risk factors including fasting plasma glucose, high-density-lipoprotein, low-density-lipoprotein, triglycerides and peak oxygen uptake capacity (VO₂ peak) remained unchanged after resistance training in patients with T2DM.

Conclusion: Resistance training can exert favorable effects on HbA1C but also on blood pressure, body composition and muscle strength of patients with T2DM. Further research is needed to determine the impact of different resistance training characteristics (volume, frequency and type of training) on the overall CV risk profile of patients with T2DM.

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Fatigue reduces patellar tendon loading in healthy volleyball players

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Introduction: Patellar tendinopathy (PT) is a highly prevalent overuse injury in volleyball and has previously been linked with overloading of the patellar tendon. Little is known, however, about whether and how patellar tendon loading is affected by fatigue during the most challenging jump activity in volleyball. Therefore, this study investigates the effect of a high-intensity, intermittent fatigue protocol on movement alterations in terms of patellar tendon loading during a volleyball spike jump.

Methods: Forty-three male volleyball players participated in this study. Three-dimensional full-body kinematics and kinetics were collected when performing a spike jump before and after the fatigue protocol. Sagittal plane joint angles, joint work and patellar tendon loading were calculated and analyzed with curve analyses using paired sample t-tests to investigate fatigue effects ($p < 0.05$).

Results: Fatigue induced a stiffer lower extremity landing strategy together with prolonged posterior pelvic tilt compared to baseline ($p = 0.001-0.005$). Decreased patellar tendon forces ($p = 0.001-0.010$) and less eccentric knee joint work ($p < 0.001$) were observed after the fatigue protocol compared to baseline.

Conclusion: Protective strategies seem to be utilized in a fatigued state to avoid additional tensile forces acting on the patellar tendon, including proximal compensations for stiff lower extremity landings. Players who do not decrease eccentric loads of the tendon after a fatiguing exercise, might be more prone for developing PT.

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Walk your brain: a two-phased pilot study of a cognitively enriched walking program.

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Introduction: Given the rising prevalence of dementia, healthy cognitive ageing is a research priority. Recently, it has been claimed that a more effective strategy to promote cognitive functioning, as compared to physical activity (PA) alone, is to combine PA with cognitive activity (CA). We conducted a two-phased pilot study of our newly developed cognitively enriched walking program for older adults (65+).

Methods: In phase one, one-on-one walk-along interviews were conducted (n = 163), during which the participant performed three cognitive tasks. The tasks were evaluated on five-point rating scales and oral feedback was gathered. In phase two, older adults (n = 19) engaged in supervised group-based cognitive walks twice a week for three weeks. Participants evaluated the enjoyability and feasibility of the program after each session in a process evaluation questionnaire on an eleven-point rating scale and more in-depth during focus groups after finishing all the sessions. Quantitative data were analyzed descriptively and qualitative data were analyzed through content analysis.

Results: Results from the walk-along interviews show that cognitive exercises were enjoyable (medians of 3-5) and relatively feasible (medians of 2-5). Integration in the walks, fun, social interaction and freedom of choice were reasons for a positive evaluation. Reasons for a negative evaluation were a lack of competition or difficulty and feeling ashamed. In phase two, the cognitively enriched walking sessions were evaluated with scores of 7 or above by more than 66% of the participants (range of scores: 5-10). However, most participants mentioned that the program should be more difficult (i.e., both physically and cognitively).

Conclusion: Based on these results, we conclude that the cognitively enriched walking program is feasible and enjoyable. Nevertheless, adaptations are needed so that all participants are adequately challenged on the physical and cognitive level, before evaluating the effects of this intervention in an RCT.

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Exogenous ketosis improves sleep efficiency and counteracts the decline in REM sleep following strenuous exercise

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Introduction: Available evidence indicates that ketone bodies may improve sleep quality. To better understand how ketone bodies impact sleep, we determined whether ketone ester (KE) intake modulates sleep disruptions induced by high-intensity exercise.

Methods: Ten well-trained cyclists with good sleep quality participated in a randomised crossover design consisting of a morning endurance training (ET_{120'}) and an evening high-intensity interval training (HIIT_{90'}) ending one hour before sleeping time after which sleep was recorded by polysomnography. Post-exercise and 30min before sleeping time, subjects received either 25g KE (EX_{KE}) or a placebo drink (EX_{CON}). A third session without exercise, but with control supplements (R_{CON}) was added to evaluate the isolated effect of exercise on sleep.

Results: Blood D-β-hydroxybutyrate concentrations transiently increased to ~3mM after exercise and during the first part of the night in EX_{KE} but not in EX_{CON} or R_{CON}. Exercise reduced REM sleep and increased wakefulness after sleep onset. Interestingly, KE ingestion improved sleep efficiency and counteracted the exercise induced disruptions in REM sleep and wakefulness after sleep onset. This was accompanied by a KE-induced increase in the nocturnal excretion of dopamine, which plays a central role in sleep stage regulation.

Conclusion: These data indicate that KE ingestion improves sleep efficiency and quality following high-intensity exercise. We provide preliminary evidence that this might result from KE-induced increases in dopamine signalling. Therefore, future studies should determine the effect of KE on brain dopamine signalling during sleep.

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Healthy Grandparenting Project: Differences in levels of physical activity and sedentary behaviour as well as body composition between caregiving grandparents, non-caregiving grandparents and non-grandparents

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Introduction: Belgium has one of the highest prevalence rates of grandparents among people aged ≥ 50 years when compared to other European countries. As grandchild care comprises various physical tasks and playful activities, this study investigated physical activity (PA) and sedentary behaviour (SB) levels and body composition in caregiving grandparents as compared to non-caregiving grandparents and non-grandparents.

Methods: In this case-control study, data collection was performed through home visits. Actigraphs GT3X(+) were used to objectively measure participants' PA and SB over a one-week period. Anthropometrics (i.e., body height and weight, waist and hip circumference) and body composition (i.e., fat%, with TANITA MC-780) were assessed. ANOVA analyses were conducted to establish differences between the three subgroups in all outcome measures considered, while controlling for participants' age, sex and socio-economic status.

Results: Two-hundred fifty-three participants were included in the analyses of which 98 were caregiving grandparents, 64 non-caregiving grandparents and 91 non-grandparents. The total sample (65.6 ± 5.8 years, 64.6% females) had a mean body mass index (BMI) of 25.7 ± 4.1 kg/m². A significantly higher amount of light intensity PA was found in caregiving grandparents (1808.6 ± 413.8 min/week) as compared to non-caregiving grandparents (1642.9 ± 528.4 min/week) ($p=0.004$) and also between caregiving grandparents versus non-grandparents (1670.4 ± 430.6 min/week) ($p=0.015$), whereas no differences were observed between non-caregiving grandparents and non-grandparents ($p=0.509$). No subgroup differences were found for moderate-to-vigorous PA ($p=0.275$), total counts ($p=0.638$), SB ($p=0.311$), BMI ($p=0.119$), waist-to-hip ratio ($p=0.169$) or fat% ($p=0.329$).

Conclusion: Providing care for grandchildren on a regular basis might have a beneficial effect on levels of light intensity PA among people aged 50 years and over. Despite this beneficial outcome, no differences were found for MVPA, nor for SB or any body composition measures. Future research should further examine whether caregiving grandparents obtained these higher amounts of light intensity PA in presence or in absence of their grandchildren.

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DEEL II – Posterpresentaties

Gaston Beunenprijs PhD-studenten

Alle jonge onderzoekers die hun doctoraat nog niet verdedigd hebben, kunnen deelnemen aan deze posterpresentatiewedstrijd. De kandidaten krijgen twee minuten tijd om hun werk te presenteren waarna er gedurende drie minuten vragen gesteld kunnen worden door de jury. Tijdens de posterwandeling zal deze jury elke deelnemende poster aandoen. De winnaar van deze wedstrijd krijgt een prijs van 150 euro, terwijl de als tweede en derde gerangschikte studenten geproclameerd worden.

Dit jaar zijn de volgende deelnemers geselecteerd:

De Bleecker Camilla (UGent)

De Block Fien (UGent)

Decorte Elise (KU Leuven)

D'Hondt Joachim (VUB)

Hardeel Julie (UGent)

Iliano Evelien (UGent)

Mertens Lisa (VUB & UGent)

Quiroz Marnef Arturo (VUB)

Vansweevelt Nina (KU Leuven)

Zhang Tonghe (KU Leuven)

Should biomechanical evaluations of volleyball specific landing tasks replace evaluations of generic landing tasks in injury screening programs?

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Introduction: With current advances in motion capture technology, biomechanical evaluations of sporting actions may soon become possible on the field. Consequently, the question arises whether biomechanical evaluations of volleyball specific jump landings could replace isolated generic jump landings (e.g. drop vertical jump).

Methods: 3D biomechanical analysis of seven male volleyball players were performed in two sessions with an interval of one week. The reliability was analyzed by calculating integrated ICC and curves of hip, knee and ankle angular displacement and moments during a drop vertical jump, spike and block jump.

Results: Good-to-excellent reliability of all kinematic variables were observed for volleyball specific landing tasks (ICC=0.62-0.94) except for ankle inversion (ICC=-0.06-0.30) and hip internal/external rotation (ICC=0.16-0.28). Moreover, reliability of kinetic variables was good-to-excellent for the volleyball specific landing tasks (ICC= 0.62-0.89), except for knee abduction moment of the block jump (ICC=0.57). The reliability of kinetic variables are higher in volleyball specific landing tasks (ICC spike= 0.89-0.71, ICC block = 0.87-0.57) compared to generic landing tasks (ICC= 0.58-0.55).

Conclusion: In summary, our data suggests that from a reliability perspective volleyball specific landings can replace generic jump landing tasks. This opens up the possibility for screening programs on the field, which will be less time consuming and more ecologically valid.

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Validity and feasibility of cognitive tests to assess the effect of physical activity on daily cognition in older adults

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Introduction: Despite the positive effects of physical activity (PA) on cognition being widely recognized, the effects on between-day fluctuations in cognition have received less attention. Since older adults experience large fluctuations, which appear to be linked with dementia, validated cognitive tests that can detect between-day fluctuations and can be easily incorporated into daily life are needed. Therefore, this study aims to assess the validity and feasibility of three short, cognitive tests in older adults' daily lives.

Methods: For this within-subject study, 36 older adults (≥ 65 y) were given a tablet on which three cognitive tests (Stroop Task (ST)), Visual Search Task (VST), Sternberg Memory Task (SMT)) and the PROMIS questionnaire, which assessed subjective cognition, were programmed. The tests assessed inhibition, attention, and working memory respectively, and were completed together with the PROMIS every evening for 14 days. Construct validity was assessed by Pearson correlations, comparing first-day outcomes of the daily tests with (1) three tests from the validated CANTAB software assessing the same domains (MTT, MTS, PRM), and (2) the first-day total PROMIS score. Feasibility was examined afterward through semi-structured interviews, in which participants' experiences with the daily tests were discussed. The interviews were analyzed using deductive thematic analyses.

Results: Preliminary validity analyses ($n=20$) showed (1) moderate to strong correlations between VST and SMT reaction time (RT), and their respective CANTAB outcomes ($r=0.346-0.537$), and (2) moderate to strong correlations between ST RT, VST RT, and SMT accuracy, and subjective cognition ($r=0.382-0.655$). The interviews indicated good feasibility when performing the tests for 14 days. Most participants reported no problems and found the difficulty appropriate.

Conclusion: Validity and feasibility analyses showed that the tests have the potential to assess daily cognition, meaning they could be used to determine the effects of PA on cognition if further analyses support these preliminary results.

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A pilot trial guiding development and investigating feasibility and usability as well as preliminary effectiveness of the PROTEIN application: PeRsOnalized nutriTion for hEalthy livINg

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Introduction: The digital health application PROTEIN aims to engage people in a healthy, nutritional and active life. To obtain information on the acceptability, usability and feasibility as well as preliminary effectiveness, pilot trials are being conducted.

Methods: A 4-week pilot study was implemented between May-October 2022. Participant attitudes and beliefs about their diet and PA were assessed with the RCQ. Their habits (diet (MEDAS), alcohol consumption (AUDIT) and PA(IPAQ)) were evaluated at baseline and follow-up. The usability and feasibility were evaluated by the SUS and UEQ.

Results: Fifty participants were included (women, n=30), 27 overweight or diagnosed with obesity and 23 patients with CVD. On average, age was 49.9 years (19-76) and BMI was 32.3 (16.7–45.3). 40.4% believed they were PA, 42.9% thought they were not. 74% were motivated to become more active. 47.6% were convinced enjoying a healthy diet, 33.3% were not sure and 19.1% reported they were not. Results from MEDAS show an increase in the intake of vegetables, fruit, legumes and nuts and a decrease in the consumption of meat, butter and candy. 70% reported being highly active at baseline, 21% and 9% reported being medium and low active respectively. Of the adhering patients (n=25) 20% reported an increase in PA, 70% maintained their level and 8% reported a decrease. Results from the SUS are showing an average of 34. The UEQ reports on almost all topics a negative score.

Conclusion: Participants were motivated to change their lifestyle. Despite, a drop-out of 41.8% was observed. Users who completed the intervention experienced a positive effect on the maintenance or progress of their healthy lifestyle. It seems that the PROTEIN-application is too complex to be user-friendly. There is need to adjust the functionality of the app to ensure an optimal impact on their lifestyles.

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Degree and evolution of functional and structural lower limb asymmetry with a possible link to injury (risk) prevention and running performance in healthy novice and highly distance runners:
A PhD project

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Introduction: Running is an endurance sport that is often associated with high injury rates. Injuries have a multifactorial aetiology in which interlimb asymmetry has been shown to play a role. Daily activities and sport practice can further accentuate such differences between body sides, resulting in both functional (e.g., unequal strength) and structural (e.g., dissimilar lean mass) asymmetry. Besides its link with injury, interlimb asymmetry has also been associated with impaired physical and/or sports performances. Given that the literature on the degree and evolution of functional and structural lower limb asymmetry in running is scarce, this project aims to gain comprehensive knowledge on the topic among novice and highly-trained distance runners.

Methods: The project's target populations include healthy 20-50 y/o age- and sex-matched novice runners, (i.e., no running experience for ≥ 5 years), highly-trained runners (i.e., running $>150\text{km/month}$) and a control group of non-runners (i.e., $<75\text{min}$ of moderate-to-vigorous intensity physical activity per week). First, a reliability study will be conducted to ensure the reliability of a functional test battery (N=54). Secondly, the link between the degree and evolution in lower limb asymmetries, injury and running performance will be assessed using a 30-week prospective study, in which participants (N=69) will be monitored regarding training exposures and potential injuries. They will also be measured on 4 test occasions at 10-week intervals to assess the degree of functional and structural asymmetry. Finally, an experimental crossover study will be conducted in which only highly-trained runners (N=42) will be measured on three test occasions at 10-week intervals. In this study, a supervised strength programme will be imposed to examine its effect on the link between running economy and changes in functional and structural asymmetry.

Results: /

Conclusion: This project will identify the extent and evolution of lower limb asymmetries and their possible role in view of injury (risk) prevention and running performance.

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The influence of training two or three times per week on hypertrophy and strength adaptations in individual muscles after 10 weeks of resistance training to failure

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Introduction: The influence of resistance training (RT) variables on muscle hypertrophy and strength gains has been extensively researched, with the main focus on whole muscle groups. Based on this, ACSM guidelines recommend training 2 to 3x/week for novices. However, an additional training may not be beneficial for every individual muscle considering their heterogeneity. Therefore, this study aimed at investigating the influence of training 2 or 3x/week on RT adaptations in individual muscles.

Methods: Twenty-one untrained individuals (22.06±2.18yrs, 11 men) performed a 10 week RT program. A within-subject design was used: limbs A and limbs B were randomly assigned to either training 2x or 3x/week. Every training session included a leg extension, leg curl, biceps curl and triceps extension exercise performed to failure (3-4 sets/exercise, 60%1RM). Dynamic strength (1RM) and muscle volume (MRI) were measured before and after the RT period. Statistical analysis was performed with Paired Samples T-tests.

Results: Dynamic strength and muscle volume increased significantly in all trained muscle groups and individual muscles ($p < 0.005$). No significant differences were found in mean strength increases between training 2x and 3x/week, for none of the exercises. No significant difference in mean hypertrophy was found for the hamstrings on muscle group level and semimembranosus, rectus femoris, vastus lateralis, medialis and intermedius on individual muscle level. However, hypertrophy was significantly higher when training 3x compared to 2x/week for the quadriceps ($p = 0.018$) on muscle group level and biceps femoris ($p = 0.012$), semitendinosus ($p = 0.045$), biceps ($p < 0.001$) and triceps brachii ($p < 0.001$) on individual muscle level.

Conclusion: Training 2 or 3x/week causes similar strength gains in muscles of previously untrained individuals. However, with regard to hypertrophy, specific individual muscles benefit more from training 3x/week. These muscles were found to have higher mean percentual increases in muscle volume, indicating that muscles that are more prone to hypertrophy may benefit more from an additional training.

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Co-creation with grandchildren and grandparents to develop an intergenerational physical activity (PA) program: what did we do and what did we learn?

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Introduction: Intergenerational PA programming involving grandchildren and grandparents could lead to increased PA levels in both age groups and other benefits. Furthermore, evidence based program development could lead to effective interventions with long term effects.

Methods: To develop an intergenerational PA program in an evidence based way, the Behaviour Change Wheel (BCW) was used in combination with a co-creation approach. Six co-creation sessions were organised in November and December 2022; three with grandparents, two with grandchildren and one with both (n = 4 grandparents; 3 female, 1 male, M = 63.5 years old and 6 grandchildren; 5 girls, 1 boy, M = 6.6 years old). Barriers and motivators to be physically active together and activities that are perceived as pleasant and feasible for both were explored. All sessions were recorded and will be analysed in NVivo. Grandparents completed a questionnaire on sociodemographic information about themselves and their grandchildren. To evaluate the co-creation process, a short questionnaire was completed by both after each session.

Results: Grandparents acted very positive in the co-creation sessions (openness, willingness to listen, good communication and interaction). Grandchildren enjoyed the sessions. Most important barriers for grandparents are physical disabilities, time, overprotectiveness, shared interests and distance. Most important motivators for grandparents are creating a stronger bond and get to know each other in a different way. For the grandchildren, it was challenging to explore specific barriers and motivators. Walking, cycling, dancing, swimming, going to the playground and to the beach are activities that both groups enjoy doing together. More detailed results will be presented at the meeting.

Conclusion: Based on the development process an intergenerational PA program will be developed and tested. An expert meeting will be organised to discuss and refine intergenerational movement activities and implementation of the intergenerational PA program before testing.

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Monitoring motor competence in 1- to 3-year-old Flemish toddlers (The MoMoCo project)

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Introduction: Motor competence (MC) is key in developing a healthy and active lifestyle, and also relates to cognitive/socio-emotional domains of human functioning. Yet, recent literature indicates a decline in (pre)school children's MC, while MC development and its influencing factors are hardly documented in 1- to 3-year-olds. As such, the World Health Organisation (WHO) pinpoints motor development research in this particular age group as a knowledge gap to address, which has led to the design of the present protocol.

Methods: Our so-called MoMoCo project is to be situated in the context of child daycare centres and will apply a mixed methods approach. Using a cross-sectional study design, we will objectively assess the current status of MC levels in 1- to 3-year-old Flemish toddlers, and investigate associations with their cognitive/socio-emotional functioning and other individual as well as environmental factors. In a subsequent prospective cohort study, we will examine individual change in toddlers' MC developmental trajectories and their cognitive/socio-emotional capacities over a 1-year timespan, identifying baseline determinants thereof. Finally, by means of focus group studies, parents' and (day)caregivers' knowledge, perceptions and needs regarding their contribution to daily MC promotion in toddlers will be explored.

Results: /

Conclusion: The MoMoCo project's main deliverables will be up-to-date regional normative values for MC assessment and monitoring in 1- to 3-year-old Flemish toddlers, and a thorough insight in individual and environmental factors driving MC and its development, including the parents'/(day)caregivers' perspectives, in order to shape successful MC interventions in the future.

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A lifestyle intervention in overweight/obese people suffering from chronic low back pain: a study protocol of a randomized controlled trial

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Introduction: Chronic low back pain (CLBP) is the most common and important clinical, social, economic, and public health problem of all chronic pain disorders across the world. The most severe and debilitated CLBP patients often show comorbidities such as overweight and obesity. In fact, pain intensity and disability in people with CLBP show dose-responses to body mass index (BMI), waist circumference, percent fat and fat mass. However, current treatments for CLBP apply a 'one-size-fits-all' approach and do not address comorbidities like obesity. Therefore, we will conduct the first international, multicentred randomized controlled trial comparing a behavioral weight reduction program combined with pain neuroscience education (PNE) and cognition-targeted exercise therapy (CTET) versus PNE and CTET alone.

Methods: All 252 participants of the control and experimental intervention will receive 18 treatment sessions in Belgium or Switzerland over a 14-week period, of which 3 sessions PNE and 15 sessions CTET. Additionally, in the experimental intervention, the use of motivational interviewing techniques will allow the integration of an individually tailored weight reduction program within the 15 sessions of the CTET intervention. Via a lifestyle approach, weight reduction and improved pain cognitions are targeted simultaneously by increasing daily physical activity and exercises levels, together with a diet change and caloric deficit. Over the course of study participation, overweight CLBP patients will undergo five assessments with the primary endpoint set at 12 months-post treatment (T4). The primary outcome measure is mean pain intensity measured by the Brief Pain Inventory. Several constructs will be assessed as secondary outcome measures, including energy balance related behavior (i.e. 24h continuous activity monitoring and sleep by a Fitbit and dietary intake using food diaries) and anthropometric data (i.e. using portable ultrasound scanner to measure muscle thickness and regional fat distribution and a TANITA to evaluate body weight and composition).

Results: Not yet available, project is ongoing.

Conclusion: This innovative project will aim at improving the current best evidence rehabilitation for overweight or obese CLBP patients.

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Changes in physical activity, sedentary behavior and sleep during the retirement transition: protocol for the move into retirement study

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Introduction: The retirement transition offers both risks and opportunities for changes in physical activity (PA), sedentary behavior (SB) and sleep. Previous studies mainly reported increases in leisure-time PA, walking, domestic activity and sleep duration, as opposed to decreases in occupational PA, active transport and total PA. Changes in SB and sleep quality have been investigated less and contradictory results are found. Groups with higher socio-economic status (SES) mostly increase their total PA, while total PA in groups with lower SES seems to decrease.

Methods: This study will consist of a quantitative and a qualitative part. In the quantitative part, the (non-)movement behavior will be measured with an Actigraph wGT3X-BT worn on the non-dominant wrist for 7 days at four time points (6 months prior to and 3, 6 and 12 months after retirement). Besides this, questionnaires will be used to measure several possibly influencing factors. The aim is threefold: 1) to describe the changes in 24-hour (non-)movement patterns and the changes in other measured factors, 2) to study the association of changes in 24-hour (non-)movement patterns with changes in other measured factors, 3) to identify the predictors of changes in 24-hour (non-)movement behaviour patterns. In the qualitative part of this study, a subgroup of the sample will be interviewed to identify barriers and facilitators for increasing or maintaining PA during the retirement transition.

Results: Analysis of the quantitative part will be based on compositional data analysis (CoDA) where this is advisable. The qualitative part will be analyzed based on thematic analysis and mapping on the 'Theoretical Domains Framework' and the 'Capability, Opportunity and Motivation for Behavior system (COM-B)'.

Conclusion: The overarching goal of this study is to gain insight in the need for an intervention and to inform the development of an optimal lifestyle intervention.

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Children's skill trials during parkour recess in different prompting conditions

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Introduction: The Comprehensive School Physical Activity Program (CSPAP) approach recommends the application of skills learned in physical education in other settings such as recess. Previous research showed the majority of children voluntarily participate in activities learned in physical education during recess. In this study we investigated the effect of different prompts by the teacher on children's performance of correct skill trials.

Methods: A 7-lesson parkour unit was taught to 45 children (2nd and 3rd grade) in one elementary school. Children could voluntarily participate in six parkour recess sessions in the school's gymnasium during lunch recess. An alternating treatment design with five purposefully selected target children was implemented. In each of the six parkour recess sessions, four prompting conditions were in random order presented by the teacher: (a) supervised free play; (b) supervised free play with encouragement; (c) demonstration of learned skills; and (d) receiving tokens contingent on performing 10 correct parkour skill trials. Data for skill trials were collected using systematic observation by trained coders.

Results: Visual analysis of line graphs from all five target children showed that the data paths of conditions C ("show me what you learned") and D ("token") were substantially higher and consistently differentiated from conditions A ("supervised free play") and B ("free play with encouragement"). Average number of correct performed parkour skills for all children was 1.4/min (condition A), 1.0/min (condition B), 3.8/min (condition C), and 4.2/min (condition D).

Conclusion: Parkour recess is a great opportunity for children to apply skills learned in physical education. Prompting children to demonstrate what they had learned in physical education with or without goal-setting and token reinforcement was most effective to promote the performance of correct parkour skill trials. This study demonstrates the contribution of physical education to the development of a physically active lifestyle.

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DEEL III – Posterpresentaties

Gaston Beunenprijs masterstudenten

Alle masterstudenten kunnen deelnemen aan deze posterpresentatiewedstrijd. De kandidaten krijgen twee minuten tijd om hun werk te presenteren waarna er gedurende drie minuten vragen gesteld kunnen worden door de jury. Tijdens de posterwandeling zal deze jury elke deelnemende poster aandoen. De winnaar van deze wedstrijd krijgt een prijs van 150 euro, terwijl de als tweede en derde gerangschikte studenten geproclameerd worden.

Dit jaar zijn de volgende deelnemers geselecteerd:

Bosmans Jana (KU Leuven)
Claeys Reinhard & Saey Ian (KU Leuven)
Corlù y Hortense (VUB)
Deboutte Jolien & de Lange Elsa (KU Leuven)
Deroost Frea & Petrella Davide (KU Leuven)
Devos Florence (KU Leuven)
Engelborghs Sofie & Vandeput (KU Leuven)
Heemels Robin (KU Leuven)
Janssens Carlo (UGent)
Leplae Jef & Vananderoye Casper (KU Leuven)
Maes Sylke (KU Leuven)
Roth Zachary (KU Leuven)
Samyn Linde & Van Dael Kaat (KU Leuven)
Schampheleer Emilie (VUB)
Van Belleghem Karel (UGent)
Van Caekenberghe Wouter (KU Leuven)
Van Dyck Matthew (UGent)
Vermeulen Lander (KU Leuven)

Preservice physical education teachers' adaptive competence in net/wall games during methods class

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Introduction: Adaptive competence in teaching is a key element in practice-based teacher education and refers to the ability of adapting the content to the needs of the students. Adaptive competence is a significant outcome of preservice teachers (PSTs) in physical education teacher education (PETE). The purpose of this study was to examine adaptive competence as a function of different levels of support in reflection during a secondary methods class.

Methods: Adaptive competence of 21 PSTs from one PETE program in Flanders (Belgium) was measured through adaptations in lesson plans. The study was conducted during a 6-week secondary methods class in badminton and volleyball. Following each class, PSTs reflected and adapted their lesson plans either after being a participant or student-teacher in methods classes, or after having a reflective meeting (RM) with experts on teaching performance. Adaptations were collected by means of the track changes function in Word. Data were descriptively and inferentially analyzed using the Statistical Package for the Social Sciences (SPSS).

Results: Overall, the 21 PSTs made a total of 601 appropriate adaptations across six lessons with a mean of 6.8 adaptations per lesson plan reflection. Mean number of adaptations per reflection were 5.03 for participants, 7.90 for student-teachers without RM and 11.94 for student-teachers with RM. Significantly more adaptations were made following the reflective meeting for total adaptations, management, task presentation, and active supervision ($p < .05$) compared to PST's who only acted as participants in the methods class.

Conclusion: Reflective meetings by experts had the largest effect on PSTs' adaptive competence. Merely participating in a methods class had a limited impact on the development of adaptive competence.

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Postoperative differences in trunk mobility between AIS patients treated with vertebral body tethering versus spinal fusion surgery

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Introduction: This study aims to make a comparison of the spinal Range Of Motion (ROM) of Adolescent Idiopathic Scoliosis (AIS) patients treated with two different surgical techniques : Spinal Fusion (SF) and Vertebral Body Tethering (VBT). Although SF, the golden standard, which permanently fuses the vertebrae has shown good long-term radiographic results, it has a negative impact on the spinal ROM of the patient. VBT preserves motion of the vertebrae and has previously shown to have better spinal flexibility than SF after a period of approximately three years. However, no short-term postoperative comparison has been made until this moment. Therefore, this study aims to compare the short term (three months and one-year) postoperative differences in trunk mobility between both surgical techniques.

Methods: This study included 24 patients (15.7 [3.7] years) diagnosed with AIS. Twelve patients were treated with the SF (17.0 [3.7] years) technique and twelve with the VBT (12.8 [1.3] years) technique. The patients were matched based on the Lenke classification. Clinical (SRS-22 and pain assessment (VAS)), radiographic (Cobb angle) and dynamic-motion (rotation, lateral- and forward bending) results were compared between the VBT and SF group at three different time points: pre-surgery (Pre-OP), three months (3M-Post) and one-year (1Y-Post) post-surgery.

Results: The T-test revealed no significant differences in SRS-22 and pain assessment at 3M-Post and 1Y-Post. Preliminary results of a smaller study sample (4 SF vs 4 VBT), have shown a greater overall loss in forward bending RoM at 3M-Post, from which they partly recover at 1Y-Post compared to VBT.

Conclusion: The preliminary data show promising results in terms of trunk mobility for the VBT technique. Further analysis of different motion tasks using a more extensive sample group together with a more detailed analysis of the spine motion using a polynomial fit will be performed in the near future.

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Continuous relative phases of walking with an articulated passive ankle-foot prosthesis in individuals with a unilateral transfemoral and transtibial amputation: an explorative case-control study

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Introduction: To improve the quality of life of people with unilateral transtibial amputations (TTA) and transfemoral amputations (TFA), a new passive ankle-foot prosthesis was developed. The aim is to evaluate the coordination walking patterns of the Talaris Demonstrator (TD) through continuous relative phases (CRPs).

Methods: The TTA and TFA individuals' current prosthesis were compared as well as to able-bodied individuals. Kinematics were captured during 6 minutes of treadmill walking in consecutive blocks of 2 minutes at slow, self-selected and fast speeds, and lower extremity CRPs were calculated. Gait cycles were defined based on the peak hip flexion angles. Additionally, one participant with a TTA was allowed to use the TD for 7 weeks. Statistical non-parametric mapping was applied and statistical significance was set at 0.05.

Results: The CRPs did not differ between the individuals' current prosthesis and the TD in people with TTA. Because of the limited sample size, no statistical tests could be conducted among individuals with a TFA. When comparing people with a TFA to able-bodied individuals, the CRP hip-knee was significantly larger in participants with a TFA at $\pm 0-5\%$ ($p=0.009$) and $\pm 75-100\%$ ($p=0.009$) of the gait cycle. In addition, results of the CRP knee-ankle in individuals with a TTA were smaller at $\pm 15-20\%$ of the gait cycle during fast ($p = 0.014$) and self-selected ($p = 0.014$) walking speeds compared to able-bodied individuals. Furthermore, the CRPs from the participant with a TTA using the TD observed over 7 weeks seems to correspond more closely to the gait pattern of able-bodied individuals.

Conclusion: This study provides lower-limb coordination patterns in people with a lower-limb amputation and reveals a possible beneficial effect of the TD over the individuals' current prosthesis. Further adequate sampled research is needed to investigate long-term adaptations in passive prostheses using CRPs.

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The CB1 antagonist AM6545 increases *in vivo* muscle protein synthesis and mTOR activation

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Introduction: Sarcopenia is the gradual degeneration and loss of skeletal muscle strength and function. The endocannabinoid system (ECS) is increasingly recognized as a target to attenuate features of muscle degeneration¹. Previous research demonstrated that CB1 antagonism increases *in vitro* muscle protein synthesis (MPS) and anabolic signaling², but this was never studied *in vivo*. The present study investigates how CB1 antagonism affects muscle anabolism and signaling upon dexamethasone-induced muscle atrophy in mice.

Methods: In a chronic experiment, muscle atrophy was induced by daily dexamethasone (15 mg·kg⁻¹ BW) treatment for 12 days. Half of the mice (n=8) were daily treated with AM6546 (10 mg·kg⁻¹ BW) while the other half was treated with vehicle. The Tibialis Anterior (TA) and Soleus (Sol) were analyzed for MPS and mTOR activation. In an acute experiment, half of the mice received a single dose of AM6545 (n=6) while the other half received vehicle. After 90 minutes, muscles were analyzed for MPS and mTOR activation, and MAPK and PKA signaling.

Results: In the TA but not Sol, MPS increased after chronic (+22%; p=0.002) and acute (+44%; p=0.041) AM6545 treatment. Acute and chronic AM6545 treatment also induced mTOR activation, which protected mice from dexamethasone-induced muscle loss (-1% vs. -6%; p=0.024). Acutely, AM6545 increased expression of the MAPK p-ERK1 whereas PKA signaling remained unaffected.

Conclusion: AM6545 treatment chronically and acutely increased MPS and mTOR activation, which protected mice from muscle wasting. These results align with previous research that demonstrated similar effects of CB1 antagonism *in vitro*. Together, these data indicate that the ECS is a promising target to combat disease- or age-related muscle degeneration.

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¹Dalle et al., J Cell Physiol 2022

²Le Bacquer et al., J Cell Physiol 2021

Triceps surae muscle force-sharing strategy during functional and rehabilitation exercises in Achilles tendinopathy patients

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Introduction: Achilles tendinopathy (AT) is a frequently occurring overuse injury associated with altered properties of the Achilles tendon. In the past, differences in force-sharing strategy within the triceps surae were observed in AT patients, as the gastrocnemius lateralis (GL) contributed relatively less while performing isometric contractions. The aim of this study was to determine whether the force-sharing strategy of the triceps surae muscles differs between participants with AT and healthy controls during four functional and rehabilitation exercises.

Methods: Fifteen AT patients (5F & 10M, 44.2 ± 13.4 yr) and fifteen control participants (3F & 12M, 40.7 ± 15.3 yr) performed functional (walking and toe walking) and rehabilitation (bilateral and unilateral heel drop) exercises while 3D motion capture and ground reaction forces were measured. Musculoskeletal modelling was used to estimate muscle forces. Individual triceps surae muscle contributions to the overall triceps surae force were calculated.

Results: In general, the soleus (SOL) contributed the most to the triceps surae force in all exercises ($65.1 \pm 16.4\%$), while the GL contributed the least ($7.2 \pm 3.5\%$). During rehabilitation exercises, GL and gastrocnemius medialis (GM) contributed less, while the SOL contributed more to the overall triceps surae force in the AT group. Larger non-significant differences ($p > 0.05$) between groups were observed during unilateral heel drop (-2.0% [GL], -4.5% [GM], $+6.6\%$ [SOL]) compared to bilateral heel drop (-0.6% [GL], -2.2% [GM], $+2.8\%$ [SOL]). During functional exercises, the GL and GM contributed more, while the SOL contributed less to the overall triceps surae force in AT patients. A larger non-significant difference between groups was seen during toe walking in the GM ($+1.8\%$) compared to walking ($+1.3\%$).

Conclusion: The muscle force-sharing strategy within the triceps surae during functional and rehabilitation exercises are not significant different between AT patients and healthy controls in the current study.

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Exogenous ketosis improves endurance performance during an 8-week endurance training period

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Introduction: Previous research demonstrated that post-exercise and pre-sleep ketone ester supplementation counteracts overtraining symptoms and improves muscular training adaptations. Since an impaired adaptive response is one of the main symptoms of overtraining, we aimed to investigate whether exogenous ketosis can also improve the adaptive response during a longer endurance training period.

Methods: 10 healthy male subjects participated in a placebo-controlled, 8-week endurance cycling training period. During the pre-, mid-, and posttests the subjects had to perform a TT_{30min}, and VO_{2max} test. Subjects were divided in two experimental groups that consumed post-exercise and 30 min before sleeping time either 25g of a ketone ester (KE) or isocaloric control drink (CON).

Results: Blood D-β-hydroxybutyrate concentrations increased to $2,0 \pm 0,3$ mM 30 minutes post exercise and to $2,5 \pm 0,6$ mM just before sleeping time and remained around $0,1 \pm 0,1$ mM in CON ($p < 0,01$ KE vs. CON). A significant main effect for the TT_{30min} was detected ($p_{\text{main}} = 0,012$), indicating that KE performed better on the TT_{30min}. TT_{30min} improved with 23% in KE and 18% in CON ($p_{\text{int}} = 0,152$) during the training intervention. No time or interaction effect was observed for VO_{2max}, indicating that both the training intervention and KE intake had no effect on maximal O₂-uptake (KE: 56 ± 5 ml.kg⁻¹.min⁻¹, CON: 55 ± 5 ml.kg⁻¹.min⁻¹; $p_{\text{int}} = 0,371$). There were no significant changes after the training period between KE and CON group for total fat free mass ($\Delta_{\text{post vs. pre}}$: KE: $+1,15 \pm 0,83$ kg, CON: $+0,55 \pm 1,13$ kg), total fat mass ($\Delta_{\text{post vs. pre}}$: KE: $+0,97 \pm 1,17$ kg, CON: $+0,86 \pm 1,11$ kg), and bone mineral density.

Conclusion: These data indicate that post-exercise and presleep KE intake improves endurance cycling performance, but not body composition, during an 8-week endurance training period.

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Ketone ester supplementation improves rehabilitation of muscle disuse atrophy

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Introduction: Immobilization results in loss of muscle mass and function. Previous research suggests that increasing blood ketone levels can attenuate muscle catabolism as well as stimulate muscle anabolism post-exercise. Therefore, we hypothesized that increasing blood ketone levels, via ketone ester ingestion, can counteract the decrease in muscle volume and muscle function induced by immobilization and promote subsequent rehabilitation.

Methods: Twenty-four subjects were enrolled in a two-week unilateral immobilization period followed by a four-week rehabilitation program involving resistance exercise training. In a randomized, double-blind, placebo-controlled, parallel group design, subjects received either 3 x 20g of a ketone ester drink [96% (R)-3-hydroxybutyl (R)-3-hydroxybutyrate] (KE, n=12) or an isocaloric placebo (CON, n=12) per day. To measure changes in muscle volume and function, subjects participated in four experimental sessions including a.o. a CT-scan (muscle volume), an assessment of maximal isometric (force) and dynamic knee-extension torque (power). Differences between both groups and over time were evaluated by a two-way repeated-measures ANOVA.

Results: Blood D-β-hydroxybutyrate concentrations increased up to ~3mM within 30min after KE ingestion, whereas in CON blood ketone levels remained at baseline (interaction effect, $p < 0.05$). During the immobilization period, muscle volume (~-6%), power (~-21%) and force (~-16%) of the immobilized leg decreased to a similar extent in both groups. By the end of the subsequent rehabilitation, muscle volume (~5%) and force (~15%) of the immobilized leg were significantly improved in the KE group ($p < 0.05$) but not in the CON group. Power of the immobilized leg improved to a similar extent in both groups. KE also increased muscular volume (~5%) in the contralateral leg ($p < 0.05$), without impacting knee extension torque.

Conclusion: These observations indicate that KE does not counteract the decline in muscle mass nor muscle function due to immobilization. However, KE accelerates subsequent rehabilitation of muscle mass and isometric knee extension torque.

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Reliability of a novel dsTMS setup investigating intrahemispheric PMd-M1 interactions

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Introduction: A novel dual-site transcranial magnetic stimulation (dsTMS) setup was developed to probe intrahemispheric connectivity between the dorsal premotor cortex (PMd) and primary motor cortex (M1). However, the test-retest reliability of this dsTMS setup, using various interstimulus intervals (ISI), has not been established.

Methods: Reliability was examined at rest in 21 healthy right-handed adults, during two identical sessions on consecutive days (± 24 hours apart). For all participants, a test stimulus (TS) was delivered to the first dorsal interosseus (FDI) area of the left M1 at an intensity eliciting 1-1.5 mV. A conditioning stimulus (CS) preceded the TS and was delivered at a fixed distance of 21.2 mm anterior to M1 at an ISI_{PMd-M1} of 3, 5, 6, 7, 8 and 10ms at 75% of the resting motor threshold (rMT). To validate the effectiveness of this setup, short-interval intracortical inhibition (SICI) and intracortical facilitation (ICF) were examined (TS intensity = 1-1.5 mV, CS intensity = 75% rMT, $ISI_{SICI} = 3ms$ and $ISI_{ICF} = 10ms$).

Results: A strong intraclass correlation coefficient (ICC) was found for ISI_{SICI} of 3ms (ICC: 0.81). Moderate ICCs were found for ISI_{PMd-M1} of 3ms (ICC: 0.47) and 6ms (ICC: 0.44). Furthermore, M1 output was strongly inhibited at an ISI_{SICI} of 3ms, ISI_{PMd-M1} of 3ms and 5ms, whereas facilitation of M1 output occurred at an ISI_{ICF} of 10ms and ISI_{PMd-M1} of 10ms.

Conclusion: In line with previous research, this novel dsTMS setup was able to reliably elicit ISI_{SICI} at 3ms. In addition, when conditioning PMd, this setup was able to reliably inhibit M1 output at an ISI_{PMd-M1} of 3ms and 5ms. Based on these findings, we can confirm the potential of this setup for probing intrahemispheric PMd-M1 connectivity, especially regarding the short-latency inhibitory pathway between PMd and M1.

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Physiological responses at different %1RM in a single-leg leg extension exercise.

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Introduction: Strength training is prescribed by using percentages of the 1 repetition maximum (RM, e.g., 60-80%1RM to develop hypertrophy). However, recent research showed that improvements can be obtained also with lower percentages if given levels of metabolic perturbation and/or muscle activation are achieved. However, the development of these two factors when working at different %1RM is still not completely described. In this study we tried to get a clearer view of the physiological response at different %1RM.

Methods: 6 subjects (22.67±1.75 years, 184.83±5.27cm, 78.13±7.99kg) performed 1RM measurement and 5 exhausting protocol at %1RM: 10%, 30%, 50%, 70% and 90% of 1-leg leg extension. Electromyography (EMG) and Near-infrared spectrometry (NIRS) were measured at the vastus lateralis (VL), Rectus Femoris (RF) and Vastus Medialis (VM) as measures of muscle excitation and muscle metabolism. Blood lactate ([La⁻]), Heart rate (HR) and rate of perceived exertion (RPE) were measured as indicator of whole-body strain. Peak values were compared using a one-way RM-ANOVA.

Results: Mean±SD 1RM was 63.25±5.71kg. Task failure occurred at repetition 195.29±140.23 for 30%, 25.24±11.79 for 50%, 12.83±1.9 for 70%, 7.66±1.77 for 90%, no failure occurred at 10% but task was stopped at repetition 450. There was a significant effect of the protocol on the EMG signals at the VL, RF, and VM (all p<0.001), as well as on NIRS (p=0.038), that were increasing as a function of %1RM. Furthermore, there was a significant effect of the protocol on RPE (p<0.001), HR (p<0.001), and [La⁻] (p=0.028), which presented higher values at the intensities where a higher number of repetitions was performed, except for the 10% 1RM who presented the lowest values in all parameters.

Conclusion: We found that metabolic perturbation and muscle activation increased as function of %1RM, suggesting that local responses are mediated by load. On the contrary, whole-body responses were a function of exercise duration.

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Effect on DFA-a1 during 30 minute time trial after 4 weeks of training

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Introduction: The subtle balance between high training stress required for physiological adaptation and the appropriate adjacent recovery has to be adequately maintained. Heart Rate Variability (HRV) constitutes a possible candidate in search of an objective marker capable of accurately monitoring one's training status on the fatigue-recovery continuum. HRV monitoring, however, occurs most often "offline" (i.e. before/after training). During training the use of HRV measurements has not broadly been embraced by either researchers, athletic monitoring device vendors, coaches or athletes. Interestingly though, novel findings regarding the degree of fractal correlation properties of the cardiac beat sequence (i.e. DFA-a1), illustrate a wide dynamic range encompassing the low, moderate and high intensity domains. More specifically, a DFA-a1 value of 0.75 has been associated with the aerobic threshold while 0.5 signifies a further loss of fractal correlation properties and is associated with the anaerobic threshold. Despite these promising results, it remains unclear how this fractional correlation can be applied as a marker for one's readiness to train or fatigue-induced decline in performances.

Methods: 20 young male volunteers (age: $25,2 \pm 2,9$ yrs, weight: $73,9 \pm 6,2$ kg) participated in a 4-week cycling training program based on their individual functional threshold, containing 6 sessions per week. DFA-a1 data was measured during a 30min time trial test (TT30) before and after the training period. Heart rate data was collected using a Polar H10 sensor and a HRV logger application which was further analyzed and transformed to DFA-a1 via postprocessing in Matlab (R2022b).

Results: As data processing is currently ongoing, we hypothesize a training-induced increase in mean power output of TT30, while DFA-a1 values remain constant. Hereby, DFA-a1 could elicit beneficial shifts in cardiorespiratory fitness.

Conclusion: If the hypothesis is confirmed, we can conclude that DFA-a1 could be an adequate marker for one's training status.

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Evaluation of the working mechanism of a newly developed powered ankle-foot orthosis: module analysis

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Introduction: Cerebral palsy (CP) is a movement and posture disorder caused by non-progressive brain deficits that occurred in the developing brain. With a prevalence of 2-3 per 1000 live births, CP is the most common motor disease in children. In order to prevent muscle contractures and/or bone deformities and to improve gait patterns, ankle-foot orthoses (AFOs) are often prescribed. While the AFO has many benefits (i.e. increase in maximum knee extension, stride length and walking speed), they also have limitations like restricting the plantarflexion during push-off. In order to improve push-off, a powered AFO (PAFO) is being developed that will generate power to assist the push-off.

Methods: Ten CP and two typically developed (TD) children between 6-17 years will be selected to participate. Each subject will receive a custom made three dimensional (3D) printed AFO, to which a powered module can be added. This device can provide plantar- and dorsiflexion assistance. To evaluate the working mechanism, a repeated (1-10 days in between) 3D gait analysis is executed at the Clinical Motion Analysis Laboratory (CMAL) from UZ Leuven for different walking conditions (i.e. barefoot, with conventional AFO (only for children with CP), with the PAFO in transparent and (25%, 50%, 75% and 100%) assistance mode. IMUs will be used to identify gait events after which specific force commands can be transmitted to the powered module. The plug-in gait marker set will be used for reconstruction of kinematic and kinetic curves of the ankle, knee and hip and calculation of spatiotemporal parameters. Statistical non-parametric mapping (Anova, unpaired T-test) will be used to determine the PAFO-effect on the kinematic and kinetic waveforms and comparison to the PAFO-effect of TD children.

Results: This study is still ongoing, there are no results yet.

Conclusion: /

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Exploring muscle synergies from estimated and observed muscle activity in children with cerebral palsy

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Introduction: Muscle synergies are simplified movement control patterns whereby the brain controls groups of muscles in fixed ratios. It is theorized that these simplified patterns are more efficient than controlling each muscle individually. Synergies are determined by applying non-negative matrix factorization (NMF), a form of dimensionality reduction, to a set of muscle activations. These activations may be observed via surface EMG or estimated via musculoskeletal modelling. Previous research in healthy participants has shown that, on average, 4 synergies are required to explain observed and estimated muscle activations during gait. Previous findings also indicate that in children with cerebral palsy (CP), observed activations during gait can be explained with fewer synergies. However, it is unclear if the estimated gait activations in children with CP can also be explained by fewer synergies than in healthy subjects. The purpose of this project was to explore the number of synergies required to explain the observed and estimated activations in children with CP during gait and other movements.

Methods: We analyzed EMG data from 7 children with CP during normal and fasts gait, squats, sit-to-stand, and counter movement jumps. For one participant, we calculated the estimated muscle activations using a generic and an MRI-based musculoskeletal model using dynamic muscle optimization.

Results: The EMG data suggests that children with CP tend to require fewer synergies to explain their movement patterns than their healthy peers. However, there was usually a marked difference in the number of synergies required to describe observed activation patterns within subjects. Additionally, we found that the estimated muscle activations from generic and MRI-based musculoskeletal models did not correspond well with the observed activations.

Conclusion: Future synergy research in children with CP should treat each limb independently. Furthermore, future research should focus on improving musculoskeletal model customization, as well as personalizing the muscle-tendon parameters used during dynamic optimization.

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The characterization of EEG connectivity changes in young and older individuals, following a bimanual motor training protocol

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Introduction: The human brain at rest is functionally organized in several resting state networks (RSNs). Interactions occur between these networks, supported by a combination of neuronal oscillations in the theta (4-8 Hz), alpha (8-13 Hz), beta (13-30 Hz) and gamma (30-80 Hz) bands (Samogin et al., 2020). Resting-state electroencephalography (EEG) studies showed less connectivity within and more between the networks in older than in young individuals (Samogin et al., 2022)

Methods: In this study we aimed to verify the neurophysiological basis of RSN interactions using high-density EEG (hdEEG). HdEEG was collected in 24 young (26 ± 3 years old) and 23 older (67 ± 4 years old) adults during resting state before and after multiple training sessions of a bimanual coordination task. The hdEEG data was used to examine the connectivity between 6 major brain networks (Samogin et al., 2022). We evaluated connectivity for both young and older participants before and after the training sessions, by using a two-way analysis of variance (ANOVA) and post-hoc tests. At last, we examined if changes in connectivity after bimanual coordination training were correlated with changes in motor performance.

Results: The ANOVA revealed that the condition (pre vs. post) and the age (young vs. old) had a significant influence on the connectivity values. The condition had an influence in the theta, alpha and beta band for both intra- and inter-network connectivity. Both intra- and inter-connectivity values were modulated by age in the alpha and beta bands. Furthermore, significant correlations were observed between the change in connectivity and the change in motor performance. These correlations were positive for older adults and negative for younger adults.

Conclusion: Our study provided evidence that connectivity changes after motor training, depending on the age of the participant, and that these changes are generally related to change in motor performance.

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Changes of energetic cost and comfort associated with changes in step frequency

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Introduction: It is known that people's most comfortable step frequency (SF) correlates to their lowest energetic cost (EC). At the preferred step frequency (PSF), mechanical power and efficiency are optimized. However, it is still unclear how people choose their most comfortable SF and how this comfort relates to the lowest EC.

Methods: The PSF was identified while walking on a treadmill at 4 km/h. Then, the SF values for 5, 10, 15 and 25% above and below the PSF were calculated and randomized. 10 participants walked for 5 minutes at each SF guided by a metronome for a total of 45 minutes. Every time the SF was changed, participants were asked to compare their comfort with the previous state. EC was calculated via pulmonary gas exchange, measured with COSMED K5 (breath-by-breath). The relationship between SF and EC was assessed using repeated measures ANOVA. Finally, independent samples t-test was used to evaluate the relationship between comfort and EC.

Results: The effect of walking at a lower SF than the preferred is significantly higher compared to walking at a higher SF for all percentual values ($P=0.043$). Additionally, the EC is 11% higher when walking at 25% below the PSF compared to 25% above the PSF ($P=0.012$). There is a significant difference in comfort, with a more comfortable feeling corresponding to a decrease in EC ($P<0.001$).

Conclusion: Even though it is a long walking test with many variations in SF, participants consistently find the SF that corresponds to a lower EC more comfortable. Moreover, it is more comfortable to walk at a higher SF compared to a lower SF since it requires less EC. Nevertheless, the most comfortable SF is the one that approximates to the PSF.

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Detection of gait events in outdoor running based on tibial accelerations

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Introduction: The accurate detection of initial contact (IC) and toe-off (TO) is a crucial aspect of the biomechanical analysis of running. Currently, the gold standard for detecting these gait events is based on force data which is only available in laboratory settings. Since running is dynamic in the real world, new methods are required for determining gait events in outdoor setting. The purpose of this study is therefore to test the accuracy of a heuristic accelerometer-based algorithm that allows for IC and TO to be detected continuously and out of laboratory settings.

Methods: Each subject ran a total of 10 laps, each consisting of a grass, peat and concrete segment. They were equipped with an accelerometer strapped to the shin and high-speed cameras were placed perpendicular to the 3 running segments. To determine the event detection accuracy of the heuristic accelerometer-based algorithm, the strides in each segment were compared to events identified using the video images.

Results: Repeated measures ANOVA will be followed by Bland-Altman plots to assess the agreement of the heuristic accelerometer-based algorithm and the video images to identify IC and TO.

Conclusion: With this study, we hope to determine the accuracy of a heuristic accelerometer-based algorithm for detecting the gait events IC and TO in outdoor running on different surfaces. The results will serve as a benchmark for further research to test more advanced gait event detection algorithms in outdoor running conditions.

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No relationship between cartilage thickness and T1rho/T2 relaxation times in participants with and without early knee osteoarthritis

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Introduction: Osteoarthritis (OA) is a chronic, degenerative joint condition that is marked by the breakdown of articular cartilage and underlying bone, which can cause stiffness and pain in the affected joints. In addition, OA contributes to the emergence of functional restrictions and impairments. The burden of OA-related illnesses on society is predicted to continue to rise due to the aging population and an increase in obesity on a worldwide scale, both of which are significant risk factors for OA. It is therefore crucial that we expand our knowledge of the underlying mechanisms in the hope of developing treatments to slow down disease progression. Quantitative methods of MRI such as T1rho and T2 mapping, which reflect relative proteoglycan content and collagen content respectively, are being used to estimate the biochemical composition of cartilage.

Methods: This study involved 10 subjects with early knee OA and 5 healthy controls, aged 45 to 65. MRI images were taken of the most affected leg in patients with OA and ad random for the controls. To calculate the cartilage thickness, 3D parts were segmented of the femoral and tibial cartilage. Using an in-house built MATLAB script, both the T1rho and T2 relaxation times were estimated by defining the region of interest in the sagittal view. The relationship between these variables was investigated using a one-tailed Pearson correlation.

Results: No significant correlations were found between the medial and lateral compartment and their respective relaxation times. This was true for both the early OA patients and the healthy controls.

Conclusion: The results suggest that there is no relationship between the relative proteoglycan and collagen content and the cartilage thickness. These results might be a consequence of the fact that we are looking at early stages of knee OA, where there might not be sufficient cartilage loss in the knee joint.

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The rise of apnea tables: are these training modalities used by elite breath-hold divers safe for subjects without apnea experience?

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Introduction: Holding your breath induces several physiological responses to protect the brain. Impairment of these responses can lead to syncope, especially when apnea duration increases. Timed repeated breath-holds such as O₂ and CO₂ tables are commonly used by trained breath-hold divers but have never been studied scientifically before. O₂ tables are characterized by increasing the duration of breath-holds in combination with fixed resting times. CO₂ tables consist of a constant duration of submaximal breath-holds in combination with decreasing resting times. The purpose of this study is to investigate whether it is safe for subjects naïve to apnea, by means of cerebral oxygenation, to perform these tables.

Methods: 28 healthy participants (17 male, 11 female) performed three static apnea protocols (maximal apnea, O₂ table and CO₂ table) in randomized order. Cerebral tissue oxygenation index (cTOI) was determined based on changes in oxygenated (O₂Hb) and deoxygenated (HHb) hemoglobin, which were continuously measured during the protocols. A RM ANOVA was used to analyze the cTOI response throughout the apnea series, within and between protocols.

Results: cTOI decreased gradually throughout the series of apneas for all protocols in both males (F = 7.724, p < 0.001) and females (F = 3.956, p = 0.017). Overall, the decrease in cTOI seemed greater when performing the maximal apnea protocol. Moreover, the decline in cTOI was more pronounced in male participants.

Conclusion: Decrease in cerebral oxygenation was less pronounced in O₂ and CO₂ tables as compared to a maximal apnea protocol. Since maximal static apneas were proven to be safe in subjects naïve to apnea, O₂ and CO₂ tables can be suggested safe as well. Nevertheless, caution and knowledge on the warning signs of syncope are needed when performing apneas and especially in males, since they have a more pronounced decrease in cerebral oxygenation.

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The relationship between overuse injuries, dynamic stability and loading during running

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Introduction: A previous study (Aristizábal Pla et al., 2021) demonstrated that wearable accelerometry can be used to distinguish injured runners from healthy runners based on relating running dynamics, captured during a 12-minute all-out run, with the occurrence of lower leg overuse injuries (LLOIs) during a six-month follow-up period. It is still unclear how accelerometer-based biomechanical features are related with ground reaction force (GRF) and joint reaction forces (JRFs) and whether the JRF- and GRF-linked features are similar to the features linked with LLOI development. Therefore, the aim of this study was to investigate whether running dynamics are associated with GRF, JRF.

Methods: Firstly, to investigate the link between LLOI and features describing running dynamics using a wearable accelerometer, two-hundred thirty-four movement science students (KU Leuven, Belgium) completed a 12-minute all-out run. Dynamic loading, dynamic stability and spatiotemporal features were calculated from the accelerometer data. Secondly, to relate running dynamics with peaks in GRFs and JRFs, nineteen frequent runners were analysed in the Movement & posture Analysis Laboratory Leuven. Musculoskeletal modelling, using a full-body retro-reflective marker set detected by 13-camera passive marker system, combined with wearable accelerometry was used to capture our data.

Results: The injured group showed a significant lower root mean square ratio (RMS) in the anteroposterior (AP) direction. Values for sample entropy and impact acceleration in the AP direction were significantly higher for the injured group compared to uninjured runners.

Conclusion: First analysis showed a significant difference between injured and uninjured runners based on accelerometer-based features. Further analysis should relate these features to peaks in GRFs and JRFs during stance phase. These results could possibly be used in training or rehabilitation context to monitor musculoskeletal load and to reduce the risk of LLOIs.

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DEEL IV – Posterpresentaties

Post-docs

Ook post-docs kunnen tijdens het VBSW symposium hun werk presenteren aan de hand van een poster. Deze presentaties vallen echter wel buiten de Gaston Beunen prijzen.

Dit jaar zijn de volgende deelnemers geselecteerd:

Colosio Alessandro (UGent)

De Clerck Tom (UGent)

Jaspers Arne (KU Leuven)

Latomme Julie (UGent)

Laureys Felien (UGent)

Versele Vickà (VUB)

Physical preparation of a world-class lightweight men double sculls team for the Tokyo 2020 Olympics

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Introduction: Purpose of this study was to analyse the physical profile and training program of a world-class lightweight double sculls rowing crew towards the Tokyo 2020 Olympics.

Methods: A case study in which both rowers performed physical testing in November 2020 and April 2021 (anthropometrics, incremental rowing test and power profiling). The training program (38 weeks) in the building up to the Olympics was analysed providing insight into training characteristics (volume; contribution of rowing, alternative, and strength training; training intensity distribution (TID)). The entire period was split in three phases: preparation period (PP:18 weeks), race period 1 (RP1:11 weeks) and race period 2 (RP2:9 weeks), and training characteristics were compared.

Results: In April 2021 testing, Rower A (height: 1.89m, weight: 74.6kg, fat percentage: 4.4%) had a VO₂peak of 5.8L.min⁻¹ (77.8mL.min⁻¹.kg⁻¹) and a peak power output of 491W. Rower B (height: 1.82m, weight: 70.6kg, fat percentage: 7.8%) had a VO₂peak of 5.5L.min⁻¹ (77.9mL.min⁻¹.kg⁻¹) and a peak power output of 482W. The mean weekly training volume was 14h47min ± 4h5min, of which 58.5±14.6% consisted of rowing, 13.4±6.8% strength training, and 28.1±12.6% alternative training. TID of rowing (power output) was 94.1±2.6% zone 1, 3.1±2.2 zone 2, and 2.8±2.6% zone 3. The contribution of zone 1 decreased (p=0.042) between PP (95.9±2.3%) and RP2 (92.0±2.6%), whereas the contribution of zone 3 increased from PP (1.1±1.2%) to RP1 (3.8±2.6%, p=0.044) and RP2 (5.2±2.4%, p=0.009).

Conclusion: The crew combined a high volume of rowing, alternative and strength training in a pyramidal TID that shifted towards more polarized during the race periods.

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Professionalizing all-volunteer sports clubs: an intervention study based on the competing values framework and self-determination theory

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Introduction: Professionalization is an important issue in many all-volunteer sports clubs. Therefore, this study relies on the Competing Values Framework (CVF) and Self-Determination Theory (SDT) to investigate whether a newly developed intervention can effectively professionalize and strengthen the sports clubs' management processes and leadership styles.

Methods: For this purpose, a rigorous non-equivalent pre-test post-test control group design was used. The intervention involved two sessions organized in Flemish sports clubs in which internal stakeholders (e.g., board members, coaches, volunteers ...) were invited to discuss change initiatives aimed at enhancing the organizational processes.

Results: An effect on both the management processes and leadership styles was found. As for the management processes, the intervention had an impact on the internal processes, with especially the development of an internal communication plan and the annual assessment of the organization's operations being promoted by the intervention. Regarding the leadership styles, the intervention had an effect on the controlling and chaotic leadership style, with leaders becoming less chaotic and controlling in situations in which (respectively) the business plan was established and the tasks were distributed within the organization.

Conclusion: The findings of the present study pointed to promising short-term effects as evidence was found for the impact of the intervention on the internal processes, which are crucial for many sports clubs, as well as an effect on the demotivating leadership styles.

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Screening assessment, perceived training load and injury incidence in a young and preselected volleyball population: results from a 3-month observation period using a retrospective design

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Introduction: The value of screening for the prediction of injury risk in team sports has been questioned. The relation between screening and injury incidence has to a lesser extent been studied in youth volleyball athletes, while the relationship between perceived training load and injury incidence is unexamined in this population.

Methods: This retrospective study analyses the information from a routine, standardized screening assessment in 46 youth elite athletes between 12-16 years. This screening included various mobility, strength and stability tests. Injuries, training participation and perceived training load using Borg scores were administered by the medical team during a 12-week follow-up period. The group with chronic overuse injuries was compared to a group without chronic overuse injuries using a Mann-Whitney U test. Effect size was reported using rank-biserial correlation (r_{pb}).

Results: Sixteen athletes (34.8%) reported a chronic injury. Only the Biering-Sørensen test ($r_{pb}=0.392$) and the relative strength for hip abduction of the right leg ($r_{pb}=0.381$) were significantly lower for the injured group. Small to moderate effect sizes were found for all other screening parameters, but no significant differences. Both groups showed no significant difference regarding perceived training load.

Conclusion: Our results confirm results in adult athletes, that screening information at group level cannot be linked with future injuries. In addition, perceived training load does not indicate injury susceptibility. Based on these results, other approaches should be explored. The use of multivariate analysis methods or personalized approaches can help in unraveling the complex, dynamic nature of injuries.

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Developing an intergenerational, cognitively enriched lifestyle intervention for MCI-patients and their (grand)children

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Introduction: In 2018, 50 million people were affected with dementia and this is forecasted to triple by 2050. An important way to “curb this tidal wave of dementia” is to prevent cognitive decline in high-risk groups such as older adults with mild cognitive impairment (MCI). Recent work has shown that the combination of PA and cognitive activity may have beneficial effects on older adults’ cognitive health, but studying new and effective ways to do so in MCI-patients is needed in dementia prevention. An intergenerational program (IGP) involving old and young generations together in one program might be innovative. Only a few IGPs have been used to promote PA and most of them lack a theoretical basis or do not sufficiently meet the target groups’ needs. This study aims to develop a novel IGP for MCI-patients to improve their cognitive, physical and psychosocial health.

Methods: The IGP will be developed using a theoretical framework in combination with a co-creation approach, actively involving the target group (i.e. MCI-patients) in the intervention development. More specifically, the ADAPT framework will be used to adapt and transfer already existing intervention(s) to a new population. In addition, 10 interviews will be conducted in which two existing interventions will be presented and evaluated by the MCI-patients: (1) an intergenerational PA lifestyle intervention for grandparents and their grandchildren, (2) a cognitively enriched lifestyle intervention for older adults. Qualitative data-analysis will be conducted to evaluate the interviews, using NVivo-software.

Results: No results are available, as the development of the intervention will take place in February-March 2023. However, presenting and discussing this development phase is relevant for the next phases of the project.

Conclusion: This study aims to develop an intervention that aims to improve cognitive, physical and psychosocial health in MCI-patients which might have important implications for future research.

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Make it or break it: interpersonal violence in gymnastics

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Introduction: Recent cases in elite gymnastics around the world have raised questions about the (un)ethical culture, as well as on the normalization of abuse in this and other sports. Specifically gymnastics is perhaps extra vulnerable to abuse, since there is often-required physical contact, participation at an early age, and a culture of authoritarian leadership. The first objective of this study is to shed light on the frequency of self-reported emotional, physical, and sexual abuse in gymnastics in Flanders, while also considering differences by discipline, competition level and gender. Secondly, to guarantee a more holistic view on abuse in sport, potential risk-increasing managerial (coaching style, and ethical climate in the club) and psychological (e.g., athlete self-esteem, competitive anxiety, and perfectionism) factors were explored.

Methods: We launched a large-scale prevalence study on abuse of gymnasts in Flanders. Using an online questionnaire, over 2500 gymnasts aged 14-30 years old, participating or having participated in (semi-)elite competitions, were surveyed with respect to their experiences with abuse while conducting their sport. Descriptive statistics and MANOVA's are used to analyse prevalence and explain variances. To assess the influence of certain variables on abuse, multiple regressions and moderator analysis were conducted.

Results: Prevalence rates show that abuse is still strongly present in Flemish gymnastics. High rates were especially found for emotional abuse. Secondly, a controlling coaching style can provoke abuse and a good ethical club-climate can protect against abuse. Personality traits such as perfectionism or self-confidence indeed have an impact on athletes' perceptions of abuse.

Conclusion: Prevalence surveys, like ours, using standardized and internationally validated instruments will provide learnings on all levels for governments, federations, and club managers to start building tools from, and as such, improve safeguarding of athletes in gymnastics and beyond.

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The influence of parental body composition and lifestyle on offspring growth trajectories.

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Introduction: Parental body composition, physical activity (PA) levels and sedentary time (ST) have been linked with offspring body weight and health. However, independent contributions of body composition, PA and ST of both parents on growth trajectories of their offspring, taking into account sex differences, has not been investigated.

Methods: Data from the Belgian longitudinal TRANSPARENTS study were used. A total of 114 mother-father-child triads were included for analyses. Parental baseline measurements were performed at 12 weeks of gestation and included objectively measured weight, height, PA and ST. Data on gestational weight gain (GWG) and birthweight and -length were obtained from medical records. Offspring weight and length were measured at 6 weeks, 6 months and 1 year of age and additional growth data were obtained through nurses as part of the governmental standard childcare. Longitudinal linear mixed models, stratified by offspring sex, were used to analyse the association between parental characteristics and offspring growth.

Results: An association between GWG (positive association), maternal moderate-to-vigorous PA (negative association) and paternal ST (positive association) and weight trajectories in girls but not in boys was found. Parental characteristics were not associated with offspring length trajectories.

Conclusion: This study highlights the contribution of GWG, maternal PA and paternal ST on the weight trajectories of their daughters during the first year of life. The impact of paternal characteristics stresses the need to further investigate health behaviours of expecting fathers in relation to offspring health. Family-based interventions are needed with a focus on increasing PA and limiting ST in both parents.

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