

**Vereniging voor Bewegings- en  
Sportwetenschappen**



**26<sup>e</sup> Symposium  
10 december 2021  
- VBSW Online -**

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## VOORWOORD

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Beste collega bewegings- en sportwetenschapper,

Omwille van de COVID-19 situatie moeten we met ons Symposium ook dit jaar noodgedwongen overschakelen op digitaal. De drang om samen te komen en te interageren met collega's bewegings- en sportwetenschappers was nochtans erg groot. Dit jaar konden we een record aantal inschrijvingen noteren met een actieve bijdrage. Het grote aantal abstracts van Masters en PhD studenten heeft ons dan ook over de streep getrokken om het Symposium niet uit te stellen of af te gelasten maar toch online te laten plaatsvinden. Vooral omdat ook dit één van de doelstellingen van de Vereniging voor Bewegings- en Sportwetenschappen is, namelijk een platform bieden voor jonge onderzoekers om hun onderzoek voor te stellen.

De motivatie van de jonge onderzoekers werd de voorbije twee jaar sterk op de proef gesteld. Heel vaak zorgde de wisselende COVID-19 situatie voor extra uitdagingen in het rekruteren van proefpersonen of het uitvoeren van testen, en flexibiliteit werd een kernkwaliteit die elke onderzoeker nodig had. Ik wil hier dan ook reeds de waardering uitdrukken in naam van de Raad van Bestuur voor elke onderzoeker die hier met een actieve bijdrage, hetzij in de vorm van een mondelinge presentatie, hetzij in de vorm van een poster, (digitaal) mee het Symposium vorm geef.

Twee jaar geleden hebben we er bewust voor gekozen om de Vereniging specifiek te richten op de universiteiten met een Opleiding Lichamelijke Opvoeding en Bewegingswetenschappen met als doel topics uit de verschillende onderzoeksgebieden binnen de bewegings- en sportwetenschappen aan bod te laten komen. De talrijke bijdrages uit sportmanagement, sportpedagogiek, inspanningsfysiologie, fysieke activiteit en gezondheid, biomechanica en motorisch leren, op dit Symposium tonen aan dat we er op korte tijd in geslaagd zijn dit interdisciplinair forum te zijn voor alle wetenschappers binnen dit vakgebied.

We zitten tevens in de nasleep van de meest succesvolle Olympische Spelen voor België van de voorbije 50 jaar. Naast de bijdrage van de jonge onderzoekers hebben we vandaag ook twee keynotes waarin duidelijk de rol van sportwetenschappen naar voor komt in de begeleiding van onze Olympische atleten. Deze keynotes tonen aan dat wat wij als bewegings- en sportwetenschapper doen een belangrijke maatschappelijke waarde kan hebben.

Na de 25<sup>e</sup> editie, zal deze 26<sup>e</sup> editie ook niet de feesteditie zijn die we voor ogen hadden. Toch denk ik dat ook deze editie, georganiseerd door de collega's van de Vrije Universiteit Brussel, de geschiedenisboeken zal ingaan als ééntje waar de kwaliteit van ons onderzoek duidelijk naar voor kwam.

Veel luister - en kijkplezier!

Jan Boone

Voorzitter VBSW - Vereniging voor Bewegings- en Sportwetenschappen

## ALGEMEEN PROGRAMMA 26<sup>e</sup> VBSW SYMPOSIUM

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<b>09.00 – 09.10</b>	<b>Verwelkoming en Introductie (Prof. dr. Eva D’Hondt)</b>
<b>09.10 – 10.40</b>	<b>Mondelinge presentaties PhD studenten - Sessie 1 (N=6)</b>
<i>10.40 – 10.50</i>	<i>Pauze (10’)</i>
<b>10.50 – 11.20</b>	<b><u>Keynote 1</u>: “Tokio 2020: De positieve spelen” - Prof. dr. Paul Wylleman (VUB)</b>
<b>11.20 – 12.10</b>	<b>Posterpresentaties in 3 parallele break-out rooms - Sessie 1</b>
<i>12.10 – 12.45</i>	<i>Lunchbreak (35’)</i>
<b>12.45 – 14.30</b>	<b>Mondelinge presentaties PhD studenten - Sessie 2 (N=7)</b>
<i>14.30 – 14.40</i>	<i>Pauze (10’)</i>
<b>14.40 – 15.10</b>	<b><u>Keynote 2</u>: “Rowing 2 Tokyo: Fysieke periodisering van de Belgian Lightweight double in aanloop naar Tokio 2020” - Prof. dr. Jan Boone (UGent)</b>
<b>15.10 – 15.55</b>	<b>Posterpresentaties in 3 parallele break-out rooms - Sessie 2</b>
<b>15.55 – 16.15</b>	<b>Bekendmaking Gaston Beunen prijzen + Algemene VBSW ledenvergadering en slotwoord (Prof. dr. Jan Boone)</b>

## GEDETAILEERD PROGRAMMA MONDELINGE- EN POSTERPRESENTATIES

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### 09.10 – 10.40 Mondelinge presentaties PhD studenten - Sessie 1 (N=6)

- 09.10 **Sarah de Jager** (UGent): “The ergogenicity of acute carnosine and anserine supplementation: the search for an underlying mechanism”  
09.25 **Arne Bouten** (UGent): “Pilot-testing a tailored online tool to optimize the motivating style of PE teachers”  
09.40 **Kian Vanluyten** (KULeuven): “PE Teachers’ Promotion of Physical Activity during a Parkour unit in elementary schools”  
09.55 **Vickà Versele** (VUB): “Determinants of changes in physical activity and sedentary behaviour during and after pregnancy: a focus group study”  
10.10 **Griet Warlop** (UGent): “A neurological investigation of action observation in children with Developmental Coordination Disorder”  
10.25 **Laurent Chapelle** (VUB): “Morphological and functional asymmetry in elite youth tennis players compared to sex- and age-matched controls”

### 11.20 – 12.10 Posterpresentaties in 3 parallele break-out rooms - Sessie 1

#### SESSIE A: Fysiologie/Trainingsleer

1. Ben Hermans & Caro Gallego (KUL, Master)
2. Bruno de Somer (KUL, Master)
3. Gitte Meeus & Lotte Slagmolen (KUL, Master)
4. Manon Kerckhove (UGent, Master)
5. Quinten Janssens (KUL, Master)
6. Jens Baelus (KUL, Master)

#### SESSIE B: Biomechanica/Motoriek

1. Femke Vermiesch (UGent, Master)
2. Lissa Aerts & Liesel De Block (KUL, Master)
3. Cedric Maréchal (UGent, Master)
4. Lisa Mertens (VUB, Master)
5. Laura Lecompte (UGent, Master)

#### SESSIE C: Biometrie/FAFG/Pedagogiek/ Management/Coaching

1. Joachim D’Hondt (VUB, Master)
2. Sebastian Fierro Suero (Univ. de Huelva, PhD)
3. Margot Ricour (VUB, PhD)
4. Florian Malisse (KUL, PhD)

### 12.45 – 14.30 Mondelinge presentaties PhD studenten - Sessie 2 (N=7)

- 12.45 **Nele Van Doren** (UGent): “Observing PE teachers’ motivating and demotivating teaching styles using a circumplex approach: How does it relate to students’ motivation?”  
13.00 **Massimo Teso** (University of Verona): “An intensity-dependent slow component of HR interferes with accurate exercise implementation in post-menopausal women”  
13.15 **Felien Laureys** (UGent): “Examining cognitive skills and psychological characteristics through sex and developmental stage in artistic gymnastics”  
13.30 **Marie Vermote** (VUB): “Determinants of physical activity and sedentary behaviour in Flemish caregiving grandparents: a qualitative study”  
13.45 **Ruben Robberechts** (KULeuven): “Exogenous ketosis increases blood and muscle oxygenation but not performance during exercise in hypoxia”  
14.00 **Elly van Hyfte** (UGent): “A PE program based upon an obstacle course positively affects motor competence in 6–7-year-old children in Flanders”  
14.15 **Jelle Habay** (VUB): “Mental fatigue impairs sport-specific visuomotor inhibitory control in trained table tennis players”

### 15.10 – 15.55 Posterpresentaties in 3 parallele break-out rooms - Sessie 2

#### SESSIE A: Fysiologie/Trainingsleer

1. Laura Fache (KUL, Master)
2. Wout Lauriks & Vincent Mermans (KUL, Master)
3. Mattice Sablain (UGent, Master)
4. Arne Hendrix & Bjarne Vercaemmen (KUL, Master)
5. Jaro Govaerts (KUL, Master)

#### SESSIE B: Biomechanica/Motoriek

1. Lennert Van der Meulen (UGent, Master)
2. Lies Blontröck (UGent, Master)
3. Kaat Bogaert (KUL, Master)
4. Alexandre Maricot (VUB, PhD)
5. Pieter Vansteenkiste (UGent, Post-doc)

#### SESSIE C: Biometrie/FAFG/Pedagogiek/ Management/Coaching

1. Kari Descheemaeker (VUB, PhD)
2. Evelien Iliano (UGent, PhD)
3. Tessa Commers (VUB, PhD)

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**DEEL I**  
**Mondelinge presentaties**  
**PhD studenten**

# The ergogenicity of acute carnosine and anserine supplementation: the search for an underlying mechanism

**de Jager Sarah**<sup>1</sup>, Blancquaert Laura<sup>1</sup>, Van der Stede Thibaux<sup>1</sup>, Lievens Eline<sup>1</sup>, De Baere Siegrid<sup>2</sup>, Croubels Siska<sup>2</sup>, Gilardoni Ettore<sup>3</sup>, Regazzoni G. Luca<sup>3</sup>, Aldini Giancarlo<sup>3</sup>, Bourgois G. Jan<sup>1</sup>, Derave Wim<sup>1</sup>

(1) Department of Movement and Sports Sciences, Ghent University, Watersportlaan 2, 9000 Ghent, Belgium; (2) Department of Pharmacology, Toxicology and Biochemistry, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium; (3) Department of Pharmaceutical Sciences, University of Milan, Via Mangiagalli 25, 20133 Milan, Italy

**Introduction:** Acutely ingesting carnosine and anserine was found to be ergogenic in maximal performances. Underlying mechanisms of these improvements are yet to be elucidated. Based on effects on peak power, along with the absence of improvements in antioxidant status or blood acidosis, two other properties of carnosine were tested. Neuromuscular potentiation (study A) and an effect on muscle blood flow (study B) were explored.

**Methods:** Two double-blinded, randomized crossover studies were conducted in healthy, active men. In study A, 15 men performed 3x 5s maximal voluntary contractions (MVC) with electrical knee extensor muscle stimulation, followed by 5x 6s cycling sprints, on two occasions on which they ingested a placebo or 30mg/kg of carnosine and anserine. In study B, 8 men performed a high-intensity cycling training (4x 4min at respiratory compensation threshold and 3min at 90% gas exchange threshold), followed by 2hours of femoral artery blood flow monitoring, on three occasions on which they ingested a placebo, 30mg/kg carnosine and anserine or a histamine H1 and H2 receptor blockade.

**Results:** In study A, plasma carnosine and anserine increased by 37.8 $\mu$ M ( $p < 0.001$ ). The concentration positively correlated with peak power improvement during the sprints ( $r = 0.65$ ;  $p = 0.01$ ), but not during MVCs ( $r = -0.22$ ;  $p = 0.44$ ). However, no effects of supplementation on performance nor electrostimulation parameters were found. In study B, the incremental area under the curve decreased by 27% ( $p = 0.05$ ) with antihistamines but was not increased with carnosine and anserine (-5%;  $p = 0.88$ ) compared to placebo.

**Conclusion:** Acutely ingesting 30mg/kg of carnosine and anserine increased plasma concentration without affecting voluntary or electrically-stimulated contraction parameters, pleading against neuromuscular potentiation as ergogenic mechanism. Second, while antihistamines reduced post-exercise hyperaemia, no opposite effect of carnosine and anserine was found, which does not support the potentiation of histamine-induced muscle perfusion hypothesis. The ergogenic mechanism of acute histidine-dipeptide supplementation therefore remains elusive.

**Correspondence e-mail:** [sarah.deJager@UGent.be](mailto:sarah.deJager@UGent.be)

# Pilot-testing a tailored online tool to optimize the motivating style of physical education teachers

Bouten Arne<sup>1</sup>, Haerens Leen<sup>1</sup>, Nele Van Doren<sup>1</sup>, Katrien De Cocker<sup>1</sup>

(1) Ghent University

**Introduction:** In 2016, 81% of adolescents worldwide were insufficiently physically active, with negative health outcomes as a consequence. Physical education (PE) teachers and—more specifically—their (de)motivating teaching style can play a crucial role in motivating students to increase their physical activity. We have developed an online tool (based on Self-Determination Theory) to help PE teachers improve their motivating teaching style. In this study we outline the tool and present the results of feasibility and acceptability tests among pre-service teachers.

**Methods:** The online tool, “V-Observer”, has three steps. During the first step, teachers complete a validated questionnaire (Situation in School Questionnaire, Physical Education [SIS-PE]; Escrivá-Boulley, 2021), resulting in a visual representation of their own (de)motivating teaching style. In step two, teachers analyze their own teaching style by annotating a video of one of their own classes. In the third and final step, teachers receive some practical tips and tricks to optimize their motivating style. We have pilot-tested V-Observer in Flemish pre-service PE teachers (University College students) who completed appreciation questionnaires ( $n = 53$ ; 66% men;  $M_{\text{age}} = 20.64 \pm 1.98$ ) and focus group interviews ( $n = 36$ ; 67% men;  $M_{\text{age}} = 20.69 \pm 2.08$ ).

**Results:** The appreciation questionnaires showed that pre-service teachers found the video annotation the most innovative (mean score on a 5-point Likert scale:  $3,90 \pm 1,02$ ) and useful step ( $3,94 \pm 0,75$ ). In turn, the pre-service teachers’ rating of usefulness had the strongest positive correlation with their intention to change their behavior ( $r = 0.6$ ;  $p < 0.01$ ). These findings were corroborated through framework analysis (a form of thematic analysis) of the focus groups.

**Conclusion:** This study provides initial support for the feasibility and acceptability of an online tool to optimize PE teachers’ motivating style. Changes to optimize the tool are proposed.

**Correspondence e-mail:** [arne.bouten@ugent.be](mailto:arne.bouten@ugent.be)

# Physical Education Teachers' Promotion of Physical Activity during a Parkour unit in elementary schools

Vanluyten Kian<sup>1</sup>, Cheng Shu<sup>1</sup>, Roure Cédric<sup>2</sup>, Seghers Jan<sup>1</sup>, Ward Phillip<sup>3</sup>, Iserbyt Peter<sup>1</sup>

(1) Department of Movement Sciences, KU Leuven (Leuven, Belgium); (2) Teaching and Research Unit in Physical Education and Sport (UER-EPS), University of Teacher Education, Lausanne, Switzerland; (3) Department of Human Sciences, The Ohio State University, 305 West 17th Avenue 256, Columbus, OH 43210-1224, USA

**Introduction:** Physical education (PE) contributes to the recommended daily 60 minutes of moderate-to-vigorous physical activity (MVPA). Quality PE should provide children with MVPA for 50% of the lesson time. Research has shown that teachers' promotion of physical activity (PA) significantly affects children's behavior. This descriptive study investigated children's MVPA and teachers' promotion of PA towards individuals and to the class as a whole.

**Methods:** Seven PE teachers from seven schools and 97 children (mean age: 8 years, 40 girls) participated in this study. After completing a professional development workshop all teachers taught a standardized ten-lesson Parkour unit to one second grade elementary class. Children's MVPA and teachers' promotion of physical activity were collected by trained observers based on video recordings using the System Of Observing Fitness Instruction (SOFIT) tool. SOFIT uses a 6-seconds observe and 6-seconds record interval to code MVPA and teacher behavior.

**Results:** In total 4870 minutes of PE were analyzed. Both girls (37%) and boys (39%) did not meet the benchmark of 50% of MPVA during PE. This difference in MVPA between boys and girls was significant,  $F= 5.177, p < .05$ ). The overall mean MVPA was 39% and ranged from 21% to 59% across classes. Physical activity promotion occurred 17% of lesson time, of which 16% was addressed towards individual children and 1% towards the whole class. Mean individual PA promotion ranged between 10% and 23% across teachers.

**Conclusion:** Teachers use only a limited proportion of lesson time to promote physical activity. Virtually all promotion was delivered to individual children. Future research should (1) investigate the effect of classwide versus individual promotion to increase children's MVPA in PE, especially for those who are at risk for low MVPA levels; and (2) train teachers to make the promotion of physical activity an integral part of their daily practice.

**Correspondence e-mail:** [kian.vanluyten@kuleuven.be](mailto:kian.vanluyten@kuleuven.be)

# Determinants of changes in physical activity and sedentary behaviour during and after pregnancy: a focus group study

**Vickà Versele**<sup>1,2</sup>, F. Marijn Stok<sup>3</sup>, Tom Deliëns<sup>1</sup>, Dirk Aerenhouts<sup>1</sup>, Benedicte Deforche<sup>1,4</sup>, Annick Bogaerts<sup>2,5</sup>, Roland Devlieger<sup>2,6</sup>, Peter Clarys<sup>1</sup>

(1) Faculty of Physical Education and Physiotherapy, Department of Movement and Sport Sciences, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium; (2) Faculty of Medicine, Department of Development and Regeneration, KU Leuven, Berestraat 49, 3000 Leuven, Belgium; (3) Department of Interdisciplinary Social Science, Utrecht University, Beidelberglaan 1, 3584 cs Utrecht, Netherlands; (4) Faculty of Medicine and Health Science, Department of Public Health and Primary Care, Ghent University, C. Heymanslaan 10, 9000, Ghent, Belgium; (5) Faculty of Medicine and Health Sciences, Centre for Research and Innovation in Care (CRIC), University of Antwerp, Belgium (6) Obstetrics and Gynaecology, University Hospitals KU Leuven, Herestraat 49, 3000 Leuven, Belgium

**Introduction:** Becoming a parent may cohere with drastic changes in physical activity (PA) and sedentary behavior (SB) for both women and men. A clear understanding of determinants of changes in PA and SB during the transition to parenthood is needed to facilitate the development of tailored family-based interventions countering unfavorable lifestyle changes during this critical life period.

**Methods:** Thirteen focus group discussions targeting determinants of changes in PA and SB behavior during pregnancy and postpartum were conducted, involving a total of 74 expecting and first-time parents. A semi-structured question guide was used to facilitate the discussions. Main and sub-categories of determinants were derived from the data using an inductive thematic approach.

**Results:** Four frameworks were developed: one for each behavior (PA vs. SB) and each period (during pregnancy vs. postpartum). Four main levels of determinants were identified: (1) the individual level, including psychological (e.g., 'safety concerns'), situational (e.g., 'time and convenience') and biological (e.g., 'recovery after pregnancy'); (2) the interpersonal level (e.g., 'social influence'); (3) the environmental level, (e.g., 'attribute prices'); and 4) the policy level (e.g., 'maternity leave'). Determinants acting as barriers (e.g., 'barriers to self-care') or facilitators (e.g., 'weight control') were identified. Determinants during both (e.g., 'self-regulation') or one investigated period or behavior (e.g., 'feeding of the baby') were mentioned. Finally, some were described by both parents (e.g., 'parenthood perceptions'), whereas others were mentioned by women (e.g., 'PA knowledge') or men (e.g., 'time opportunities') only.

**Conclusion:** The developed frameworks set the foundation for the development of family-based interventions and may be used by healthcare providers to support women and men towards a physically active pregnancy and parenthood. Parents(-to be) should be sensitized, educated and supported to find a balance between self- and baby-care, to improve self-regulation skills, and to cope with interpersonal and situational constraints and parenthood perceptions.

**Correspondence e-mail:** [vicka.versele@vub.be](mailto:vicka.versele@vub.be)

# A neurological investigation of action observation in children with Developmental Coordination Disorder

**Warlop Griet**<sup>1</sup>, Cracco Emiel<sup>2</sup>, Deconinck J.A. Frederik<sup>1</sup>

(1) Department of Movement and Sports Sciences, Ghent University; (2) Department of Experimental clinical and health psychology, Ghent University

**Introduction:** Children with Developmental Coordination Disorder (DCD) experience substantial difficulty to learn motor skills, to the extent that it significantly impacts their daily functioning. Motor learning is a result of strong associations between motor representations and the sensory consequences of motor actions. Due to these strong sensorimotor connections, observing a motor action primes the motor representation of that action. In DCD, it is hypothesised that the motor learning difficulties are related to deficient motor representations. Therefore, we aimed to examine the integrity of this low-level mechanism of action observation in DCD.

**Methods:** Two experiments were used to test the extent to which observation of a motor action triggers internal action representations in children with and without DCD (age range: 10-14). Using an automatic imitation task, the direct influence of simultaneously executing motor actions while observing incompatible movements was tested. In an apparent biological motion task, it was tested whether sequences of static body postures were perceived as biological movement. In both tasks, EEG informed us about the neural responses related to action observation.

**Results:** Preliminary results in a sample of 7 typically developing and 7 children with DCD indicate similar automatic imitation effects between the groups. However, the EEG indicated lower P3 amplitudes in DCD, suggesting lower engagement in the cognitive processes related to distinguishing the externally triggered motor representations and the executed motor action. The apparent biological motion task informed us that children with DCD bind successive body postures into a continuous movement percept to an equal extent as their peers, indicated by similar neural responses between the groups.

**Conclusion:** In search of the underlying mechanisms of the motor learning problems in DCD, it was found that automatic imitation is preserved in children with DCD and when observing successive static body postures they do perceive them as biological movement.

**Correspondence e-mail:** [griet.warlop@UGent.be](mailto:griet.warlop@UGent.be)

# Morphological and functional asymmetry in elite youth tennis players compared to sex- and age-matched controls

Laurent Chapelle<sup>1</sup>, Chris Bishop<sup>2</sup>, Joachim D'Hondt<sup>1</sup>, Eva D'Hondt<sup>1,3</sup>, Peter Clarys<sup>1</sup>

(1) Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel, Brussels, Belgium; (2) London Sport Institute, Middlesex University, London, United Kingdom; (3) Department of Movement and Sports Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium.

**Introduction:** Morphological asymmetry refers to side-to-side differences in body composition (e.g., lean mass) whilst functional asymmetry refers to side-to-side differences in physical performance (e.g., strength) between opposing upper or lower extremities. Although both lean mass and functional asymmetry, each by itself, have been associated with a decreased sport-specific performance and increased injury risk, no study has examined both types of asymmetry simultaneously. Therefore, this study examined the relationship between lean mass and functional asymmetry in terms of their magnitude and direction in the upper as well as lower extremities of youth tennis players versus controls.

**Methods:** A total of 41 youth tennis players (12.3±1.6 years, 51.2% boys) and 41 sex- and age-matched controls participated in this cross-sectional study. Based on anthropometric measurements (circumferences, widths), bioelectrical impedance analysis (lean mass) and a test battery consisting of field-based unilateral tasks (handgrip strength, seated shot-put throw, plate tapping, single leg countermovement jump, single leg forward hop test, 6 m single leg hop test, 505 change of direction (time and deficit)), asymmetry magnitudes were determined by means of the percentage difference method. Separate ANOVAs were used to compare the dominant (overall highest/best value) against the non-dominant (highest/best value of the opposing extremity) morphological/functional test result. Linear regressions explored the relationship between lean mass and functional asymmetry magnitudes, whilst Kappa coefficients were used to verify the consistency in direction between the extremity displaying the highest lean mass value and the extremity performing dominantly across tasks both at the upper and lower body level.

**Results:** Significant asymmetry magnitudes were found for all upper and lower extremity morphological and functional outcome measures in both groups, being significantly more pronounced in the youth tennis players ( $p < 0.05$ ) compared to the controls. No linear relationship was apparent between lean mass and functional asymmetry magnitudes ( $p$ -value range=0.121-0.981). Despite finding (almost) perfect consistency in asymmetry direction between both types of asymmetry ( $k$ -value range=0.84-1.00) for the upper extremity, poor to slight consistency ( $k$ -value range=-0.03-0.15) was found for the lower extremity.

**Conclusion:** Since lean mass and functional asymmetry do not seem to be related in terms of their magnitude and direction, both types of asymmetry should be examined and interpreted independently. Future research is needed to examine the development of asymmetries in tennis as well as their influence on sports-specific performance and injury incidence using a longitudinal design.

**Correspondence e-mail:** [laurent.chapelle@vub.be](mailto:laurent.chapelle@vub.be)

# Observing physical education teachers' motivating and demotivating teaching styles using a circumplex approach: How does it relate to students' motivation?

Van Doren Nele<sup>1</sup>, De Cocker Katrien<sup>1</sup>, Flamant Nele<sup>2</sup>, Vanderlinde Ruben<sup>3</sup>, Haerens Leen<sup>1</sup>

(1) Sports Pedagogy, Department of Movement and Sports Sciences, University Ghent, Belgium; (2) Developmental Psychology, Department of Developmental Personality and Social Psychology, University Ghent, Belgium; (3) Teacher Education and Professional Development, Department of Educational Studies, University Ghent, Belgium

**Introduction:** Self-Determination Theory-based studies showed the importance of developing physical education (PE) teachers' motivating style (i.e. being autonomy-supportive and providing structure) while minimizing their demotivating style (i.e. being controlling and chaotic). Teachers' motivating style is associated with various positive students' outcomes, whereas a teacher's demotivating style is related to negative student outcomes. However, most research relied on self-reported measures. This study extends previous research by using observations to assess teachers' (de-)motivating style.

**Methods:** The study sample consisted of 65 PE-teacher (M age = 40,15 (11,50)) and 904 students (M age = 13,23 (1.18)). One PE-lesson of each teacher was video- and audiotaped. At the end of each lesson, students completed questionnaires on their motivation (i.e. autonomous motivation, controlled motivation, and amotivation). Experts used a newly-developed observation tool to rate teachers' (de-)motivating style. Intrarater-, interrater-reliability and internal consistency of the items were assessed. Internal validity was assessed by examining the structure of the items relying on multidimensional scaling. Finally, multilevel analyses were performed to examine the relations between observed (de-)motivating style and students' motivation.

**Results:** The observation tool showed good reliability and validity, with observations confirming the circular structure of a teachers' (de-)motivating style. Teachers' autonomy-supportive, structuring, and chaotic style were significantly related to students' autonomous motivation and amotivation. More specifically, students experienced more autonomous motivation when the teachers was more autonomy-supportive ( $p = 0.01$ ) and structuring ( $p = 0.01$ ), and less chaotic ( $p = 0.03$ ), and students reported more amotivation when the teacher was less autonomy-supportive ( $p = 0.07$ ) and structuring ( $p < 0.01$ ), and more chaotic ( $p = 0.01$ ). Teachers' controlling style showed a trend towards a significant negative relation with controlled motivation ( $p = 0.07$ ).

**Conclusion:** Based on observations, the findings reveal that students value and enjoy PE-lessons more if their teachers are more autonomy-supportive and structuring, and less chaotic.

**Correspondence e-mail:** [nele.vandoren@ugent.be](mailto:nele.vandoren@ugent.be)

# An intensity-dependent slow component of HR interferes with accurate exercise implementation in post-menopausal women

Massimo Teso<sup>1</sup>, Alessandro L Colosio<sup>2</sup>, Silvia Pogliaghi<sup>1</sup>

(1) Department of Neurosciences, Biomedicine and Movement Sciences, University of Verona; (2) Department of Movement and Sports Sciences, Ghent University, Watersportlaan 2, Ghent, Belgium

**Introduction:** A time-dependent dissociation between Heart rate (HR) and metabolism can lead to a misprescription of the intensity ingredient of the exercise dose. **Purpose:** we tested the hypothesis that a slow component of HR (i.e. scHR) occurs in all intensity domains, greater than the slow component of oxygen uptake (sc $\dot{V}O_2$ ), and we developed an equation to predict it across exercise intensities.

**Methods:** 18 healthy, post-menopausal women ( $54 \pm 4$  years) performed on a cycle-ergometer: *i)* a ramp incremental test for thresholds and  $\dot{V}O_{2max}$  detection; *ii)* 30-min constant-load trials at 40, 50, 60, 70, and 80 % $\dot{V}O_{2max}$  for the measurement of the slow component of HR,  $\dot{V}O_2$ , stroke volume (SV) and body temperature (T). scHR and sc $\dot{V}O_2$  were compared by two-way RM-ANOVA (intensity and variable); scHR (bpm·min<sup>-2</sup>) was predicted with a linear model based on exercise intensity relative to the respiratory compensation point (RCP).

**Results:** a scHR significantly increase across the domains ( $p < 0.001$ ) and was present in all of them. Moreover scHR was greater than sc $\dot{V}O_2$  ( $p < 0.001$ ) and significantly correlated with the sc $\dot{V}O_2$  ( $r^2 = 0.46$ ), scT ( $r^2 = 0.52$ ) and relative intensity ( $r^2 = 0.66$ ). A linear equation accurately predicts scHR based on %RCP ( $r^2 = 0.66$ , SEE = 0.15).

**Conclusion:** A slow component of HR is present in all domains of exercise, its amplitude being larger with increasing intensity and about twice as large as the sc $\dot{V}O_2$ . Moreover, the rate of increments can be simply detected with good accuracy by using %RCP. Whenever the implementation of the workload is impossible or impractical and exercise is prescribed on HR targets, we need to be mindful of the mismatch between the slow components of HR and metabolic load/ $\dot{V}O_2$ . An adjusted HR target over time would grant that the desired stimulus is maintained throughout the exercise session in a given individual.

**Correspondence e-mail:** [massimo.teso@univr.it](mailto:massimo.teso@univr.it)

# Examining cognitive skills and psychological characteristics through sex and developmental stage in artistic gymnastics

Laureys Felien<sup>1</sup>, Deconinck J.A. Frederik<sup>1</sup>, Collins Dave<sup>2</sup>, Lenoir Matthieu<sup>1</sup>

(1) Department of Movement and Sports Sciences, Ghent University, Belgium; (2) Moray House School of Education and Sport, University of Edinburgh, UK

**Introduction:** The Talent Development (TD) pathway in is a dynamic, complex and nonlinear process, during which athletes have to face many challenges. During all TD stages, cognitive skills and psychological characteristics are necessary to successfully overcome these challenges. This is especially important in early specialisation sports such as gymnastics

**Methods:** This cross-sectional study explored both executive functions (EF) and psychological characteristics (PCDE), by means of an online test battery and on-paper questionnaire, in male and female high-level artistic gymnasts between 9 and 26 years old. First, a variable-centred approach, with a (M)ANOVA comparing a quasi-control and a gymnastics group on age, developmental stage and sex was applied. Second, a person-centred approach using scatterplots examined intra- and interpersonal differences within a selected group of four high-level gymnasts.

**Results:** In the youngest age group, a general improvement with age for EF was observed, and gymnasts scored higher on several PCDE factors than the control group. The older age group showed that gymnasts had significantly higher scores on inhibition than the quasi-control group. Scores in several PCDE factors were in favour of the gymnasts compared to the quasi-control group. The scatterplots showed a more similar profile between all four gymnasts and the quasi-control group for the EF components, but inter- and intra-variation was more pronounced for the PCDE-profiles.

**Conclusion:** This study showed that inhibition, imagery use, and self-directed control and management could be potential performance indicators in gymnastics. The scatterplots seemed to indicate that once an athlete scored above a specific threshold on all variables, there is no necessity for trying to maximise each and every of these skills, but rather leave room for individual profile variation. Since individual profiles were indeed observed, we recommend an athlete-centred approach in all TD phases from a young age onwards.

**Correspondence e-mail:** [felien.laureys@Ugent.be](mailto:felien.laureys@Ugent.be)

# Determinants of physical activity and sedentary behaviour in Flemish caregiving grandparents: a qualitative study

Marie Vermote<sup>1,2,3</sup>, Line Van Espen<sup>1</sup>, Benjamin Cuyvers<sup>1</sup>, Benedicte Deforche<sup>1,2</sup>, Tom Deliens<sup>1</sup>,  
Eva D'Hondt<sup>1</sup>

(1) Department of Movement and Sport Sciences, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium; (2) Department of Public Health and Primary Care, Ghent University, C., Heymanslaan 10, 9000 Ghent, Belgium; (3) Research Foundation – Flanders (FWO), Egmontstraat 5, 1000 Brussels, Belgium.

**Introduction:** Evidence on the factors influencing physical activity (PA) and sedentary behaviour (SB) in older adults providing care for their grandchild(ren) is limited, even though this knowledge seems imperative in the broader context of healthy aging. This explorative qualitative study aimed to identify the determinants of PA and SB levels among Flemish caregiving grandparents, both in absence and especially in the presence of their grandchild(ren) aged between 0-5 years.

**Methods:** Six online focus group discussions were conducted via MS Teams, all of which were audio- and videotaped with permission granted by the participating grandparents. In total, nine caregiving grandfathers and 28 caregiving grandmothers participated (mean age= 60.4±4.0y). Based on grounded theory, an inductive approach was used to derive subcategories, categories and themes from the verbatim transcribed data using NVivo R1.

**Results:** Caregiving grandparents' levels of PA and SB were both influenced by individual determinants (e.g., physical health, grandparental responsibilities), interpersonal determinants (e.g., characteristics of the grandchild [such as age, motor development, mood, interests], support of the partner) and physical environmental determinants (e.g., weather and seasonal circumstances, duration and timing of providing care). PA levels were further affected by additional individual determinants (e.g., grandparents' age, health consciousness on daily PA), interpersonal determinants (e.g., characteristics of the grandchild [such as behaviour]) and physical environmental determinants (e.g., opportunities for PA within the environment). Additionally, some individual determinants (e.g., educational benefit of particular television shows), interpersonal determinants (e.g., characteristics of the grandchild [such as cognitive ability, health]) and physical environmental determinants (e.g., inside or outside activities) were strictly mentioned for SB.

**Conclusion:** The determinants unravelled in this study can be used in the development of future interventions focussing on PA and SB within a grandparental population, taking the interplay of the abovementioned types of determinants within a well-maintained grandparent-grandchild relationship into account.

**Correspondence e-mail:** [marie.vermote@vub.be](mailto:marie.vermote@vub.be)

# Exogenous ketosis increases blood and muscle oxygenation but not performance during exercise in hypoxia

Ruben Robberechts<sup>1\*</sup>, Chiel Poffé<sup>1\*</sup>, Tim Podlogar<sup>2,3</sup>, Martijn Kusters<sup>4</sup>, Tadej Debevec<sup>2,5</sup>, Peter Hespel<sup>1,4</sup>

(1) Exercise Physiology Research Group, Department of Movement Sciences, KU Leuven, Leuven, Belgium; (2) Department for Automation, Biocybernetics and Robotics; Jožef Stefan Institute, Ljubljana, Slovenia; (3) Faculty of Health Sciences; University of Primorska, Izola, Slovenia; (4) Bakala Academy-Athletic Performance Center, KU Leuven, Leuven, Belgium; (5) Faculty of Sport, University of Ljubljana, Ljubljana, Slovenia

\*Contributed equally as co-first author

**Introduction:** Available evidence indicates that elevated blood ketones are associated with improved hypoxic tolerance in rodents. From this perspective, we hypothesized that exogenous ketosis by oral intake of the ketone ester (R)-3-hydroxybutyl (R)-3-hydroxybutyrate (KE) may induce beneficial physiological effects during prolonged exercise in acute hypoxia. As we recently demonstrated KE to deplete blood bicarbonate, which per se may alter the physiological response to hypoxia, we evaluated the effect of KE both in the presence and absence of bicarbonate intake (BIC).

**Methods:** Fourteen highly trained male cyclists performed a simulated cycling race (RACE) consisting of 3h intermittent cycling (IMT<sub>180'</sub>) followed by a 15-min time-trial (TT<sub>15'</sub>) and an all-out sprint at 175% of lactate threshold (SPRINT). During RACE, fraction of inspired oxygen (FiO<sub>2</sub>) was gradually decreased from 18.6 to 14.5%. Before and during RACE, participants received either i) 75g ketone ester (KE), ii) 300 mg/kg body mass bicarbonate (BIC), iii) KE+BIC or iv) a control drink in addition to 60g carbohydrates per h in a randomized, crossover design.

**Results:** KE counteracted the hypoxia-induced drop in blood (SpO<sub>2</sub>) and muscle oxygenation by ~3%. In contrast, BIC decreased SpO<sub>2</sub> by ~2% without impacting muscle oxygenation. Performance during TT<sub>15'</sub> and SPRINT were similar between all conditions.

**Conclusion:** In conclusion, KE slightly elevated the degree of blood and muscle oxygenation during prolonged exercise in moderate hypoxia without impacting exercise performance. Our data warrant to further investigate the potential of exogenous ketosis to improve muscular and cerebral oxygenation status, and exercise tolerance in extreme hypoxia.

**Correspondence e-mail:** [ruben.robberchts@kuleuven.be](mailto:ruben.robberchts@kuleuven.be)

# A physical education program based upon an obstacle course positively affects motor competence in 6–7-year-old children in Flanders

van Hyfte Elly<sup>1,2</sup>, Vercruyse Sien<sup>1</sup>, Warlop Griet<sup>2</sup>, Lenoir Matthieu<sup>2</sup>

(1) Department of Teacher Training, Faculty of Education and Social Work, HOGENT University, Ghent; (2) Department of Movement and Sport Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent.

**Introduction:** Physical Education (PE) in a school context provides an optimal gateway for the development of motor competence (MC) as it guarantees that virtually all children can be reached. In order to increase the MC level of all children, current insights on motor learning should be given a central place within PE curriculum. The aim of this study was to investigate whether a PE program, consisting of a series of 10 lessons including an obstacle course and designed according to the latest theoretical insights on motor learning, has a positive impact on the MC of the 6–7-year-old Flemish children.

**Methods:** A total of 16 primary schools were randomly allocated to control or intervention group. PE teachers from intervention group received and implemented the PE program, whereas the controls continued their own scheduled lessons. The Körperkoordinationstest für Kinder 3 (KTK3) was used in the overall sample of 187 boys and 168 girls to evaluate the MC at the start of the intervention (pre), after 5 lessons (inter) and after implementing the total PE program (post).

**Results:** The MC in the intervention group improved more compared with the control group (Time × Group interaction,  $p < .001$ ). Positive evolutions were established in both walking backwards along a balance beam, moving sideways on boxes and jumping sideways. Both girls and boys showed a significant overall improvement. Moreover, a 64% shift to a more favorable MC classification is seen in the intervention group compared to the control group.

**Conclusion:** The implementation of the PE program based on the latest insights of error-free learning, learning with external focus and differential learning, provides a better development in MC of the pupils in the first year of primary school and might be used as an invitation to the field to optimize the current PE programs.

**Correspondence e-mail:** *elly.vanhofte@UGent.be*

# Mental fatigue impairs sport-specific visuomotor inhibitory control in trained table tennis players

Jelle Habay<sup>1\*</sup>, Matthias Proost<sup>1\*</sup>, Jonas De Wachter<sup>1</sup>, Jesùs Diaz-Garcia<sup>2</sup>, Kevin De Pauw<sup>1,3</sup>, Romain Meeusen<sup>1</sup>, Jeroen Van Cutsem<sup>1,4</sup>, and Bart Roelands<sup>1</sup>

(1) Human Physiology and Sports Physiotherapy Research Group, Faculty of Physical Education and Physio-therapy, Vrije Universiteit Brussel, Pleinlaan 2, 1050 Brussels, Belgium; (2) Faculty of Sport Sciences, University of Extremadura, Caceres, Spain; (3) BruBotics, Vrije Universiteit Brussel, Brussels, Belgium; (4) Vital signs and performance monitoring research Unit, LIFE Department, Royal Military Academy, Avenue de la Renaissancelaan 30, B-1000 Brussels, Belgium

\* Jelle Habay and Matthias Proost contributed equally and share first authorship.

**Introduction:** Mental fatigue (MF) is a psychobiological state caused by prolonged cognitive activity, which negatively impacts human performance. Research has shown that MF impairs sport-specific psychomotor performance across a myriad of sports, including table tennis (TT). Although some research already exists implying that some TT-performance outcomes are impaired by MF, sports such as TT require a more detailed overview of MF-performance decrements, such as visuomotor inhibitory control ability.

**Methods:** Eleven trained TT players participated in this randomized counterbalanced crossover study. Participants were either required to perform a Stroop task (MF) or watch a documentary (control). The primary outcome was reaction time, assessed by using a TT-specific visuomotor task that included both simple (i.e. non-inhibitory) and inhibitory stimuli. Electroencephalography was measured throughout the trials. Secondary outcome measures include the subjective level of MF experience, motivation, rating of perceived exertion (RPE) and other traditional parameters.

**Results:** Subjective mental fatigue was significantly higher in the MF-condition compared to the control condition ( $p < 0.001$ ). Nonetheless, no decrease in the Stroop performance was present. Reaction time on the visuomotor task, specifically on the inhibitory stimuli ( $p = 0.001$ ), was slowed down in the MF-condition compared to the control condition. RPE increased in both groups, while motivation and other secondary outcome measures remained uninfluenced. Spectral power (in upper  $\alpha$  band and  $\theta$  band) during the visuomotor task was decreased by MF, while event related potentials remained unaltered.

**Conclusion:** The present study confirms that MF negatively impacts TT-performance, specifically inhibitory-related performance. Furthermore, this study also demonstrates, that the MF-associated decrease in TT-performance is associated with neurophysiological changes in the brain. Future studies should aim to follow-up neurophysiological changes during sport-specific tasks to create further insights in this matter. Moreover, coaches and other personnel employed in TT should be aware of MF and its effects, and possible ways to counteract it.

**Correspondence e-mail:** [jelle.habay@vub.be](mailto:jelle.habay@vub.be)

**DEEL II**  
**Posterpresentaties**  
**Masterstudenten**

# Differences in muscle protein expression between elderly with low and preserved muscle strength

Hermans Ben<sup>1</sup>, Gallego Caro<sup>1</sup>, Dalle Sebastiaan<sup>1</sup>, Koppo Katrien<sup>1</sup>

(1) Exercise Physiology Research Group, Department of Movement Sciences, KU Leuven, Leuven, Belgium

**Introduction:** Sarcopenia is an age-related muscle disease characterized by loss of muscle mass, function and strength. Age-related changes in signaling pathways can contribute to the sarcopenia phenotype. Whereas previous studies focused on differential expression patterns in young vs. old skeletal muscle, it remains not fully clear which pathways underlie the sarcopenia phenotype, of which muscle strength is the primary criterion. Therefore, the present study compares the activity of signaling pathways that are relevant in age-related muscle plasticity between older adults with preserved vs. older adults with low muscle strength.

**Methods:** Subjects: Older adults (65-84 years old) were categorized in a preserved muscle strength (PMS; n=13, 71.5 ± 2.6 years) or a low muscle strength (LMS; n=11, 78 ± 5 years) group according to their performance on the chair-stand test and hand grip strength, as defined by the EWGSOP2 criteria. Muscle biopsies from vastus lateralis were taken with the modified Bergström technique. Protein expression of catabolic, oxidative, stress and myogenic markers were quantified using the western blot technique. Statistics: An unpaired t-test or Mann Whitney U test was used depending on the normality of the data. Results were considered significant with p<0.05 and a trend was set at p = 0.05 – 0.10.

**Results:** No differences were found for the catabolic markers (Atg12, p62, p/tot FOXO1, p/tot FOXO3a, MuRF1, MAFbx, LC3b-II/I) or the oxidative markers (CS, PGC1α, COX-IV) between the PMS and LMS group. However, COX-IV tended to be lower (-35%; p = 0.090) in the LMS group. Surprisingly, the inflammatory transcription factor p/tot p65NFκB was more highly expressed in the PMS vs. the LMS group, whereas stress markers CHOP (43%; p = 0.018) and p/tot ERK1/2 (40%, p = 0.056) were higher in the LMS group. Myogenic markers Pax7, MyoD and Desmin were also unexpectedly higher in the LMS vs PMS group.

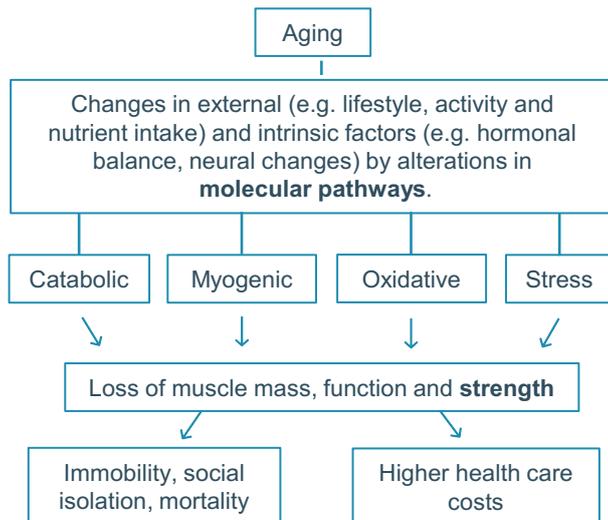
**Conclusion:** This study suggests that catabolic and oxidative markers are unlikely to be determinants of age-related sarcopenia, whereas the expression of myogenic and stress factors was different between groups. Future work should further reveal whether these latter factors can be targeted to reverse the sarcopenia phenotype.

**Correspondence e-mail:** [sebastiaan.dalle@kuleuven.be](mailto:sebastiaan.dalle@kuleuven.be)

## Differences in muscle protein expression between elderly with low and preserved muscle strength

Hermans Ben, Gallego Caro, Dalle Sebastiaan, Koppo Katrien

### 1. Introduction



### 2. Methods

#### Subjects

**EWGSOP2**  
 - Chair stand test >15s  
 - Hand grip strength <27kg (♂) / 16kg(♀)



Preserved muscle strength  
 N=13 (71.5 ± 2.6 years)

Low muscle strength  
 N=11 (78 ± 5 years)

#### Lab analysis

Muscle biopsies

Protein extraction

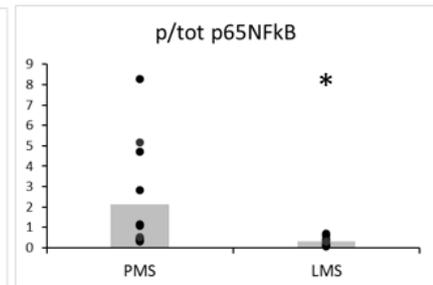
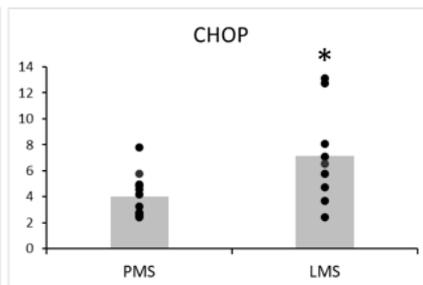
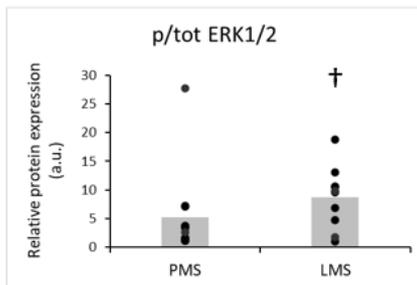
Western blot

#### Statistics

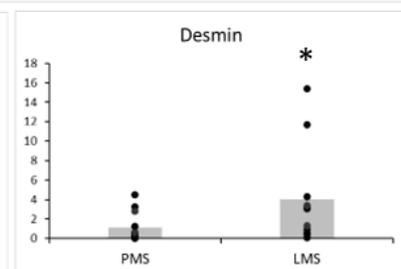
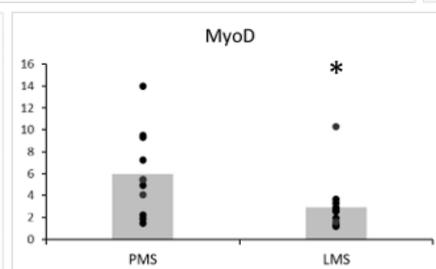
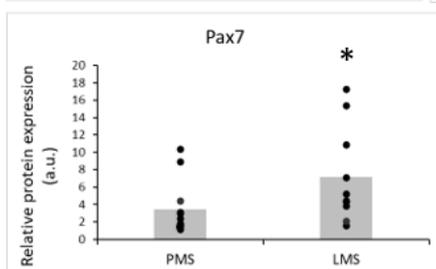
Unpaired t-test / Mann Whitney U test

### 3. Results

#### Stress markers



#### Myogenicity



Catabolic markers  
 Oxidative markers

No differences between groups

\* p < 0,05  
 † p = 0,05 - 0,10

### 4. Conclusion

Based on our results, catabolic and oxidative markers do not seem to be major determinants of age-related muscle strength. On the other hand, the expression of myogenic and stress factors were different between groups. Therefore, future work is needed to determine whether targeting these factors could reverse the sarcopenia phenotype.

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- [3] Norman K, Otten L. Financial impact of sarcopenia or low muscle mass - A short review. Clinical nutrition (Edinburgh, Scotland). 2019;38(4):1489–95.

# Potential beneficial effects of cannabidiol on sports performance and recovery. A literature review

de Somer Bruno<sup>1</sup>, Moniek Schouten<sup>1</sup>, Dalle Sebastiaan<sup>1</sup>, Koppo Katrien<sup>1</sup>

(1) Exercise Physiology Research Group, Department of Movement Sciences, KU Leuven, Leuven, Belgium

**Introduction:** The bioactive effects of cannabis sativa have incentivized various research domains to study its possible applications both in clinical and non-clinical populations. While this plant contains over 140 cannabinoids,  $\Delta^9$ -tetrahydrocannabinol ( $\Delta^9$ -THC) and cannabidiol (CBD) have been examined most, of which the latter might enhance athletic performance. The World Anti-Doping Agency (WADA) removed CBD from the prohibited list, causing the rate of CBD use to increase among athletes. However, studies on the effects of CBD on sports performance are still scarce, and there is an increasing need to understand the physiological and psychological effects of CBD on athletes.

**Methods:** For this narrative literature review, a PubMed search was performed with search terms for the exposure (“CBD”, “Cannabidiol” or “Cannabinoids”) and the outcome (“anti-inflammatory”, “analgesic”, “anxiolytic”, “anti-oxidant”, “neuroprotective”, “appetite”, “sleep”). Only intervention studies in humans or animals were included. Our search mainly resulted in preclinical studies in animal models (n= 29) and in clinical trials involving mainly healthy subjects (n= 19).

**Results:** Animal models showed that CBD attenuates inflammatory responses, hereby promoting muscle regeneration. CBD and its anti-inflammatory properties in the muscle can be extrapolated to other categories as well; inflammation is strongly connected to oxidative and neuroprotective processes, which are other determinants of performance and recovery. Besides, CBD was proven to suppress nociceptive and neuropathic pain, which both impair physical and psychological resilience of the athlete. Finally, studies suggested that CBD reduces anxiety and improves sleep quality.

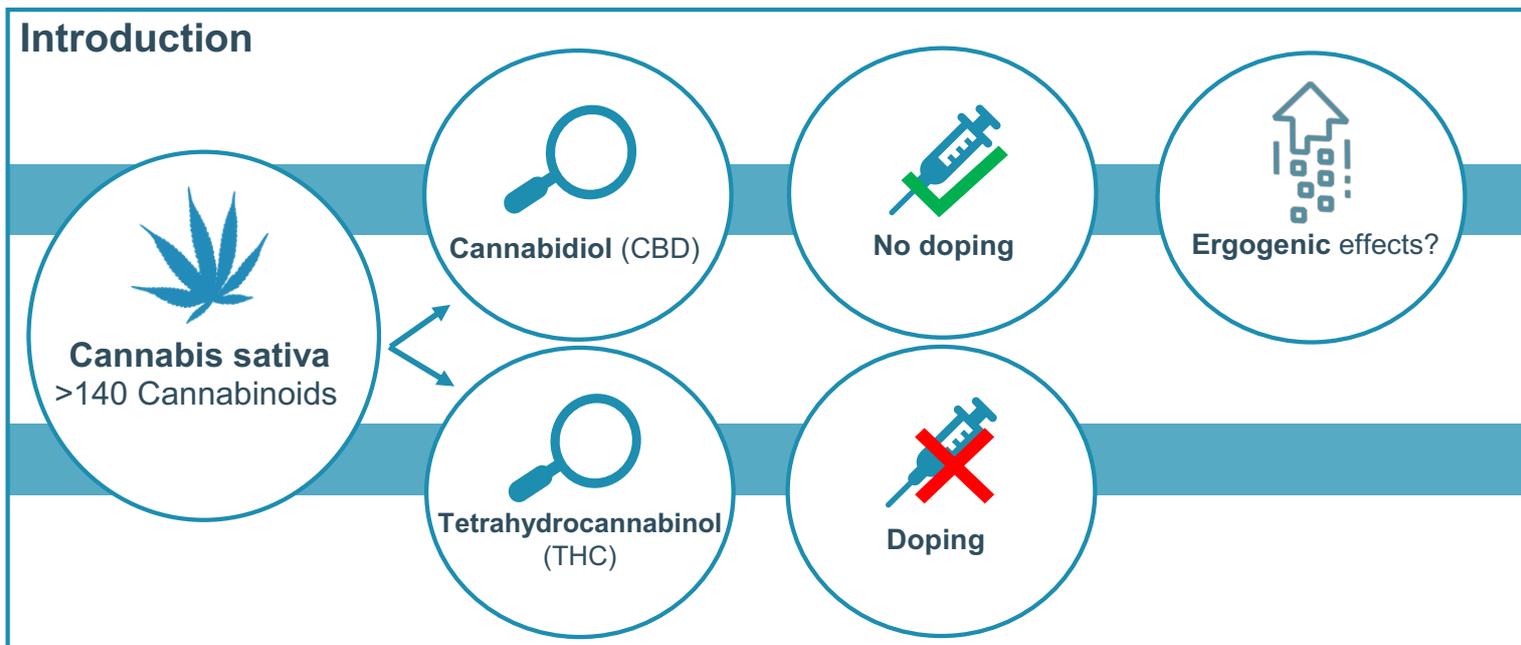
**Conclusion:** Beneficial effects of CBD in a (pre)clinical context are omnipresent, and while these findings serve as a blueprint for exercise, extrapolation to athletes should be taken with caution. More studies in this population are imperative.

**Correspondence e-mail:** [moniek.schouten@kuleuven.be](mailto:moniek.schouten@kuleuven.be)

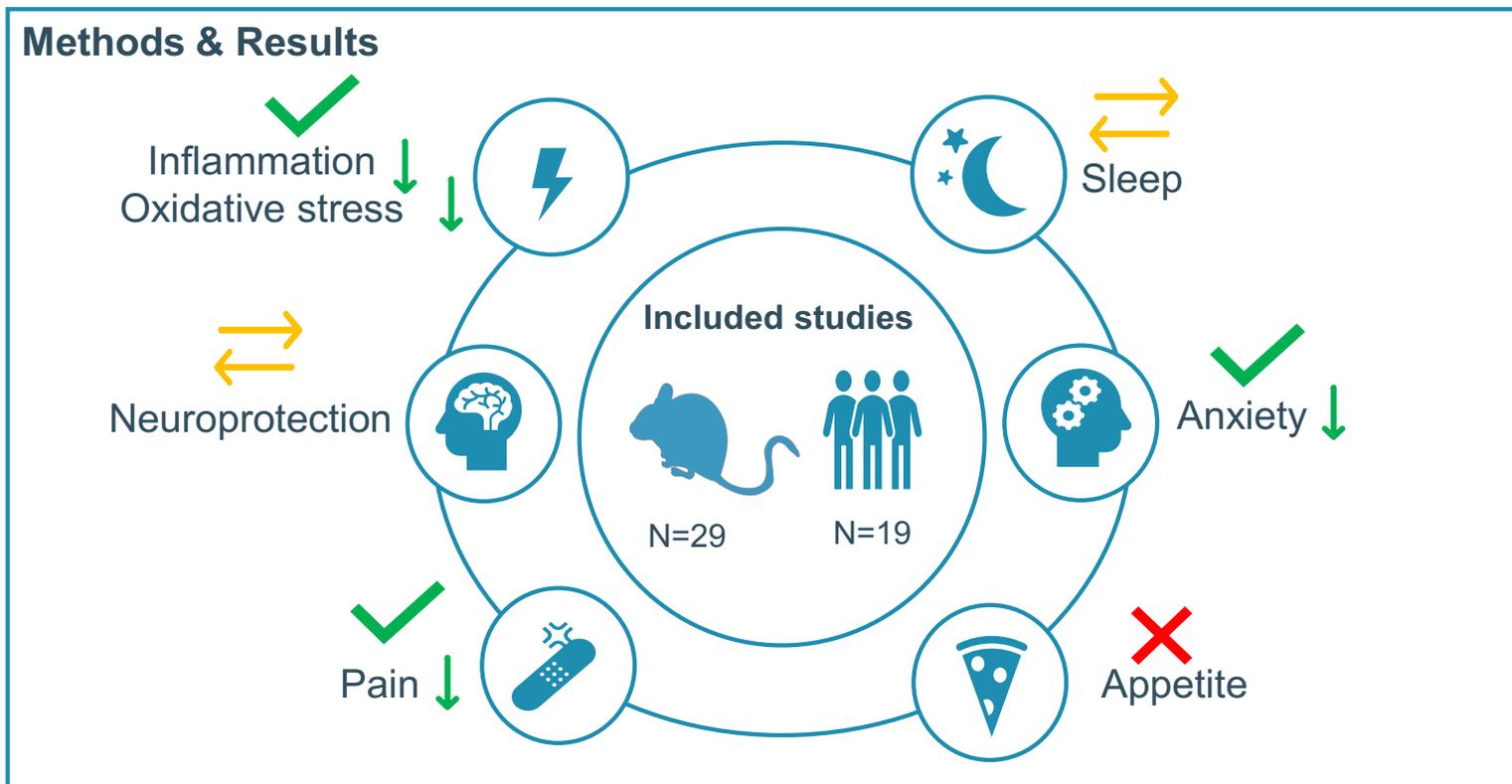
## Potential beneficial effects of cannabidiol on sports performance and recovery. A literature review.

de Somer Bruno, Schouten Moniek, Dalle Sebastiaan, Koppo Katrien

### Introduction



### Methods & Results



### Conclusion

Beneficial effects of CBD in a (pre)clinical context are omnipresent, and while these findings serve as a blueprint for exercise, extrapolation to athletes should be taken with caution. More studies in athlete populations are imperative.

### References



# Could the cannabinoid system become a new strategy to combat sarcopenia?

Meeus Gitte<sup>1</sup>, Slagmolen Lotte<sup>1</sup>, Dalle Sebastiaan<sup>1</sup>, Koppo Katrien<sup>1</sup>

(1) Exercise Physiology Research Group, Department of Movement Sciences, KU Leuven, Leuven, Belgium

**Introduction:** Sarcopenia is an age-related progressive skeletal muscle disorder, characterized by the loss of muscle strength, mass and function. Due to an increasingly ageing population, sarcopenia is an enormous challenge for our society. Therefore, it is important to discover novel targets that improve muscle maintenance with advancing age. Recent insights indicate that the cannabinoid system may play a regulatory role in muscle mass maintenance via the expression of muscle cannabinoid receptors (CBR). More precisely, CBR1 and CBR2 might be important in muscle regeneration, fibrosis, oxidative capacity and inflammation, which are features that characterize the old muscle. Therefore, CBRs might be a promising target for treating age-related sarcopenia.

**Methods:** In the first experiment, 18 young males (22-27 years) and 14 non-sarcopenic elderly ( $\geq 65$  years) were recruited. Muscle biopsies were taken to compare CBR expression of young and old muscles. In the second experiment, differences in muscle CBR expression of 19 non-sarcopenic elderly ( $\geq 65$  years) were studied pre and post 12-week resistance exercise (RE). Lastly, CBR expression was determined in fiber type-specific way.

**Results:** CBR1 expression was higher in old compared to young muscles (+25%,  $p = 0.045$ ), while CBR2 expression was not different ( $p=0.460$ ). Additionally, the expression of CBR1 (+11%,  $p=0.0548$ ) and CBR2 (+37%,  $p=0.066$ ) tended to be higher after RE. Whereas CBR1 was more expressed in type I fibers (+288%,  $p<0.001$ ), the abundance of CBR2 was more pronounced in type II fibers (+268%,  $p=0.001$ ).

**Conclusion:** This study for the first time explored CBR expression in two models of human muscle plasticity. These data, together with existing literature in cell and animal models, indicate that the cannabinoid system might be a promising target to treat muscle degeneration. However, more interventional evidence (in humans) is still needed to explore the mechanistic paths via which CBRs affect muscle physiology.

**Correspondence e-mail:** [sebastiaan.dalle@kuleuven.be](mailto:sebastiaan.dalle@kuleuven.be)

# Could the cannabinoid system become a new strategy to combat sarcopenia?

Gitte Meeus, Lotte Slagmolen, Sebastiaan Dalle & Katrien Koppo

## Background

Sarcopenia is characterised by age-related loss of muscle mass and strength<sup>1</sup>

- Can still not be fully reversed, so there is a need for novel targets

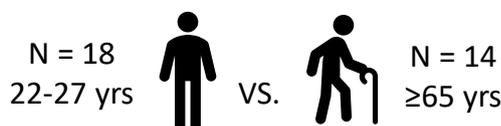
Cannabinoid system consists of ligands and receptors (e.g. CBR1 and CBR2)

- Functional role in nervous tissue and immune cells, recent studies show that it also plays a role in metabolic tissue<sup>2,3</sup>

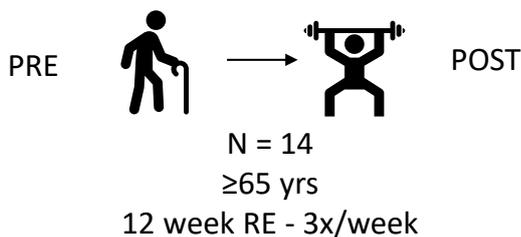
**Research question:** Is the CBR expression in human skeletal muscle responsive to ageing and resistance exercise (RE)?

## Methods

1. Determine CBR expression in young vs old (Western Blot)



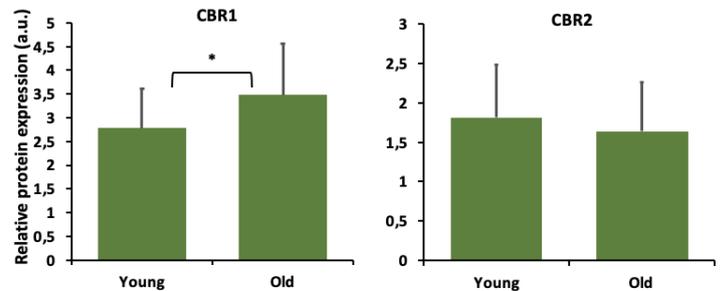
2. Determine CBR expression PRE vs POST RE (Western Blot)



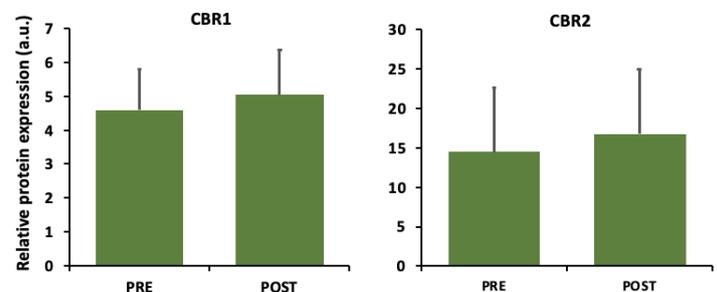
3. Determine CBR expression in fiber type-specific way (Immunohistochemistry)

## Results

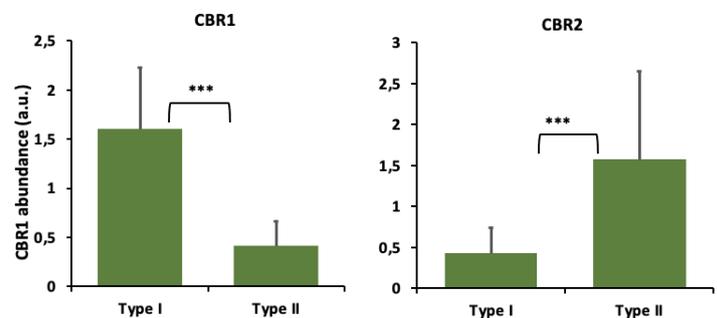
### 1. CBR expression in young vs old muscle



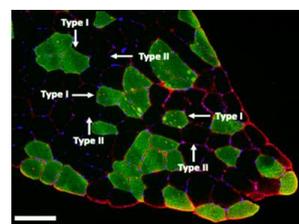
### 2. CBR expression PRE vs POST RE



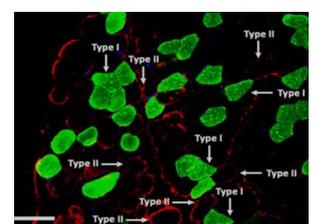
### 3. CBR expression in fiber type-specific way



### CBR1



### CBR2



## Conclusion

CBR1 and CBR2 are both expressed in muscle tissue and the expression is different in type I and II fibers. Furthermore, the extent of CBR1 expression is age-related. These data, together with existing literature, indicate that the cannabinoid system might be a promising target to treat muscle degeneration. However, more intervention studies are needed to explore the mechanistic paths via which CBRs affect muscle physiology.

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# Evaluating tolerance to heat in 3 Olympic athletes: A case study

Kerckhove Manon<sup>1</sup>, Bourgois Gil<sup>1,2</sup>, Boone Jan<sup>1,2</sup>, Bourgois Jan<sup>1,2</sup>

(1) Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium; (2) Physiological Academy for Coaching & Education (PACE), Ghent University, Ghent, Belgium.

**Introduction:** Athletes were expected to perform in extreme circumstances (30-34°C; 60-70% humidity) at the Olympic Games in Tokyo (2021). This case study describes how non-acclimatized Olympic athletes cope with acute heat stress during exercise.

**Methods:** A cyclist (woman; 24 years; 67.9 kg; 179.0 cm), runner (man; 25 years; 59.2 kg; 175.0 cm) and rower (man; 28 years; 79.8 kg; 189.0 cm), qualified for the Tokyo 2020 Olympics, performed a heat stress test (HST) in the lab (34°C, 70% relative humidity and 2 m.s<sup>-1</sup> wind speed) 4-5 months prior to competition, to evaluate their tolerance to heat. They executed a sport specific test of 65 min, which included six work bouts (WB) of 3 min at individual anaerobic threshold (AnT) alternating with 2 min recovery at individual aerobic threshold (AT). Core temperature (T<sub>core</sub>; ingestible pill) was measured together with heart rate (HR) and blood lactate concentration (BLa). No hydration was allowed during the test and total sweat loss was calculated afterwards.

**Results:** T<sub>core</sub> surpassed critical values during exercise, with at the end respectively 39.96°C (cyclist), 40.71°C (runner) and 40.32°C (rower). Increased HR was observed between in WB1 and WB6 at AnT (+ 10.3 ± 2.6%) and AT (+ 8.8 ± 5.7%). BLa exceeded a steady state which normally should occur at AnT, 3.5 ± 0.9 mmol.L<sup>-1</sup> (WB1) vs. 7.3 ± 2.6 mmol.L<sup>-1</sup> (WB6). Total sweat loss was 1.8 L.h<sup>-1</sup> (- 2.8% body weight), 1.3 L.h<sup>-1</sup> (- 2.4%) and 2.0 L.h<sup>-1</sup> (- 2.8%), respectively for the cyclist, runner and rower.

**Conclusion:** Remarkable negative influences of heat on cardiovascular, metabolic and performance parameters were observed. Critical thresholds were exceeded, with considerable inter-individual differences. HST was the first step in a 5-6 months guidance program up to Tokyo 2020 in order to improve future performance in the heat by individualized cooling strategies and acclimation.

**Correspondence e-mail:** *gil.bourgois@UGent.be; manon.kerckhove@UGent.be*

# Road to Tokyo 2020: evaluating tolerance to heat in 3 Olympic athletes

Kerckhove Manon, Bourgois Gil, Boone Jan, Bourgois Jan

## INTRODUCTION

Athletes were expected to perform in extreme circumstances (30-34°C; 60-70% humidity) at the Olympic Games in Tokyo, Japan (2021) [1]

Case study of non-acclimatized Olympic athletes:

Cyclist  
Woman; 24y; 67.9 kg; 179 cm

Runner  
man; 26y; 59,2 kg; 175 cm

Rower  
man; 28y; 79.8 kg; 189 cm

Goal: Assess how elite endurance athletes cope with acute heat stress

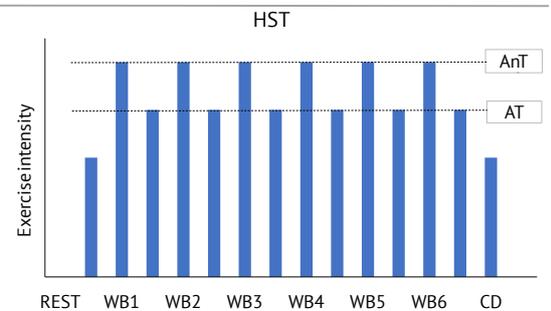
## METHODS

Environmental conditions:

34°C  
70% RH  
2 m.s<sup>-1</sup>

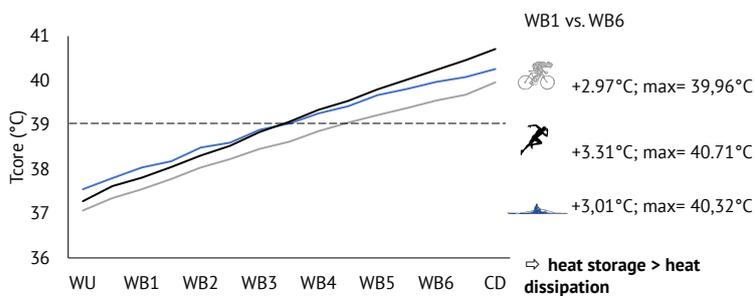
Sport-specific Heat Stress Test (HST)

- 10' Rest
- 10' Warming-up (WU)
- 30' Interval
  - 6 x 3' @ Anaerobic threshold (AnT)
  - 6 x 2' @ Aerobic threshold (AT)
- 5' Cool down (CD)
- 10' Rest

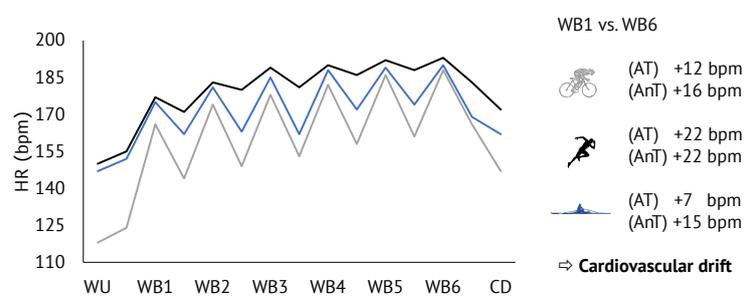


## RESULTS

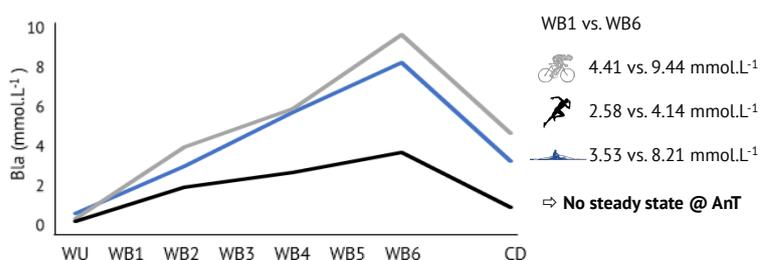
### CORE TEMPERATURE



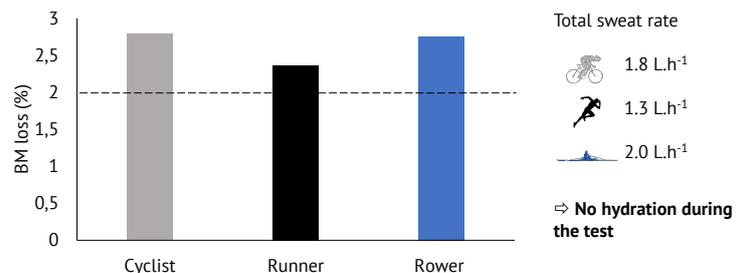
### HEART RATE



### BLOOD LACTATE CONCENTRATION



### BODY MASS LOSS



## CONCLUSION

Remarkable negative influences of heat on cardiovascular, metabolic and performance parameters [2]

Critical thresholds exceeded with considerable inter-individual differences

The HST was the first step in a 5-6 months guidance program up to Tokyo 2020 -> individualized cooling strategies and acclimation.

## REFERENCES

- [1] Gerret, N. et al. (2019)  
[2] Périard, J. D. et al. (2021)

# Exogenous ketosis does not affect sympathetic nervous system activity following strenuous exercise

Janssens Quinten<sup>1</sup>, Duym Jente<sup>1</sup>, Robberechts Ruben<sup>1</sup>, Hespel Peter<sup>1</sup>

(1) Exercise Physiology Research Group, Department of Movement Sciences, KU Leuven, Leuven, Belgium

**Introduction:** Available evidence indicates that ketone bodies downregulate sympathetic activity and improve post-exercise recovery. Therefore, we investigated whether oral ketone ester (KE) intake can suppress sympathetic nervous system activity following a pre-sleep intensive training session and consequently improve sleep architecture.

**Methods:** Eleven recreational or competitive cyclists participated in three experimental sessions separated by a 1-week washout period. Two experimental sessions consisted of a 120-minute cycling endurance training session 2 hours after breakfast, and a 60-minute high-intensity-interval cycling training session ending one hour before sleep. In a randomized crossover design, participants received either 25g ketone ester (EX<sub>KE</sub>) or an isocaloric placebo (EX<sub>PL</sub>) immediately after each training session, as well as 30 minutes before sleep. Additionally, a third experimental session without exercise was added (R<sub>PL</sub>) in which the subjects also received placebo. Urine was collected during day and night and blood samples were taken 30 min before sleep-time. Sleep architecture was recorded using polysomnography.

**Results:** KE ingestion transiently elevated blood D-β-hydroxybutyrate to ~ 3 mM 30 min after each training session and just before sleep-time. Urine epinephrine and norepinephrine during the day were similar between conditions ( $P > 0.05$ ). However, at night, urine epinephrine and norepinephrine were significantly higher in EX<sub>KE</sub> and EX<sub>PL</sub> as compared to R<sub>PL</sub>. No difference was observed between EX<sub>KE</sub> and EX<sub>PL</sub>. Similarly, blood epinephrine and norepinephrine were significantly higher 30 min before sleep-time in EX<sub>KE</sub> and EX<sub>PL</sub> compared to R<sub>PL</sub>. Unfortunately, the sleep architecture data has yet to be analyzed.

**Conclusion:** In contrast to our initial hypothesis, ketone bodies do not decrease sympathetic nervous system activity following strenuous exercise. On the other hand, pre-sleep intensive exercise, elevates sympathetic activity at night. Consequently, if an improvement in sleep quality in the EX<sub>KE</sub> condition would be observed, a decrease in sympathetic activity cannot be the underlying physiological mechanism.

**Correspondence e-mail:** [quinten.janssens@student.kuleuven.be](mailto:quinten.janssens@student.kuleuven.be)

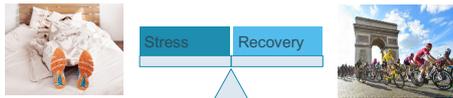
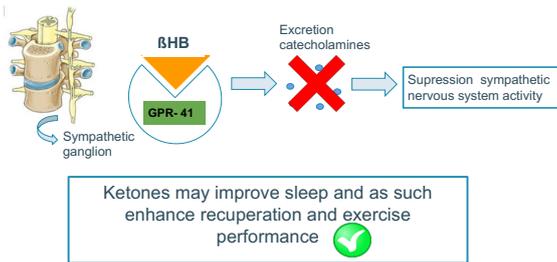
## Exogenous ketosis does not affect sympathetic nervous system activity following strenuous exercise

Janssens, Q., Duym, J., Robberechts, R., Albouy, G., Hespel, P.

### Background

Exogenous ketones directly affect sympathetic activity?

→ Possibly by antagonizing GPR-41

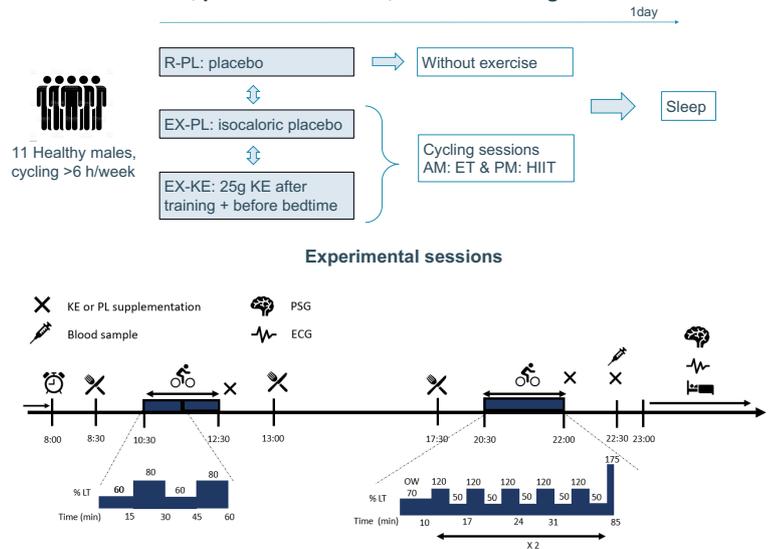


Aims:

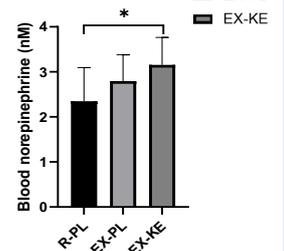
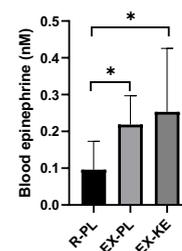
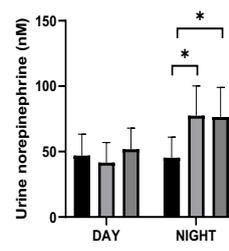
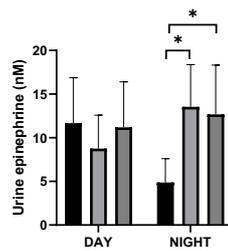
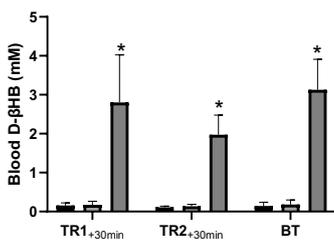
- To investigate the acute effects of a strenuous training day on sleep architecture and autonomous nervous system activity
- To investigate the acute effects of oral KE intake on sleep architecture and autonomous nervous system activity after a strenuous training day

### Methods

Double blind, placebo controlled, crossover design



### Results



### Conclusion

**X** Ketone bodies do not decrease sympathetic nervous system activity following strenuous exercise

**✓** Pre-sleep intensive exercise elevates sympathetic activity at night

↪ If an improvement in sleep quality in the EX<sub>KE</sub> condition would be observed, a decrease in sympathetic activity cannot be the underlying physiological mechanism



### References

- Poffé C, Ramaekers M, Van Thienen R, Hespel P. Ketone ester supplementation blunts overreaching symptoms during endurance training overload. *J Physiol*. 2019; 597(12):3009-3027
- Kimura I, Inoue D, Maeda T, Hara T, Ichimura A, Miyauchi S, Kobayashi M, Hirasawa A, Tsujimoto G. Short-chain fatty acids and ketones directly regulate sympathetic nervous system via G protein-coupled receptor 41 (GPR41). *Proc Natl Acad Sci U S A*. 2011 May 10;108(19):8030-5

# The effects of different exercise modalities, including aerobic exercise and resistance training, on resting energy expenditure in healthy subjects: a feasibility study

**Baelus Jens**<sup>1,2</sup>, Verhaegen Zico<sup>1</sup>, Stessens Tom<sup>1</sup>, Heyrman Jolien<sup>1</sup>

(1) Rehabilitation sciences and physiotherapy, University of Antwerp; (2) Biomedical research in movement sciences, Catholic University of Leuven

**Introduction:** Cancer patients often cope with cachexia, altering their body composition (BC) and therefore affecting resting energy expenditure (REE). Former studies provide promising evidence regarding the effects of exercise on BC, but information on its ability to influence REE is lacking in both cancer population and healthy subjects. Therefore, this feasibility study aims to provide recommendations for a research protocol studying the effects of an aerobic exercise program (AEP) and resistance training program (RTP) on REE in healthy subjects, whereafter it may be implemented in the cancer population.

**Methods:** Women aged between 30 and 70 years without underlying conditions influencing REE or the execution of an exercise program were included. Subjects were offered the choice to participate in an 8-week, telemonitored AEP or RTP. Primary outcomes (REE, fat mass, fat-free mass), secondary outcome (multidimensional fatigue inventory-20 scores) and training intensities were assessed at baseline. After 2 weeks, a qualitative survey was conducted regarding testing procedures and training experiences.

**Results:** Six participants enrolled in the AEP. The main refusal reason was travel distance to the research facility. Other aspects influencing recruitment rates were insufficient recruitment methods and extensive training volumes. During assessment, participants experienced problems comprehending intensity assessment procedures. All assessment methods are valid and reliable, except from bioelectrical impedance analysis. Regarding the intervention, time-burden and incomprehension of training procedures were the main obstacles.

**Conclusion:** Further research should recruit in the proximity of the research facility by spreading flyers, social media and involving target-group organizations. To make RTP more appealing, education and group sessions to enhance social support are highly recommended. BodPod is a reliable and valid alternative for BC assessment. Regarding the comprehension of data collection and training procedures, familiarization sessions and/or education are recommended utilizing informative videos. Finally, high-intensity interval training is a convenient alternative to reduce time-burden.

**Correspondence e-mail:** [jens.baelus@student.kuleuven.be](mailto:jens.baelus@student.kuleuven.be)

# THE EFFECTS OF DIFFERENT EXERCISE MODALITIES, INCLUDING AEROBIC EXERCISE AND RESISTANCE TRAINING, ON RESTING ENERGY EXPENDITURE IN HEALTHY SUBJECTS: A FEASIBILITY STUDY



Baelus Jens<sup>1,2</sup>, Heyrman Jolien<sup>2</sup>, Stessens Tom<sup>2</sup> & Verhaegen Zico<sup>2</sup>

(1) Department of Movement Sciences, KU Leuven, Tervuursevest 101, 3001 Leuven, Belgium

(2) Department of Rehabilitation Sciences and Physiotherapy REVAKI-MOVANT Research Group, Faculty of Medicine and Health Sciences, University of Antwerp, Universiteitsplein 1, 2610 Antwerp, Belgium

✉ jens.baelus@student.kuleuven.be

## INTRODUCTION

- 50 - 80% of all cancer patients suffer from cachexia<sup>1</sup>
- Alterations in body composition affect resting energy expenditure (REE) → fat-free mass (FFM) as main determinant
- Former studies: promising effect of exercise on body composition<sup>2</sup>

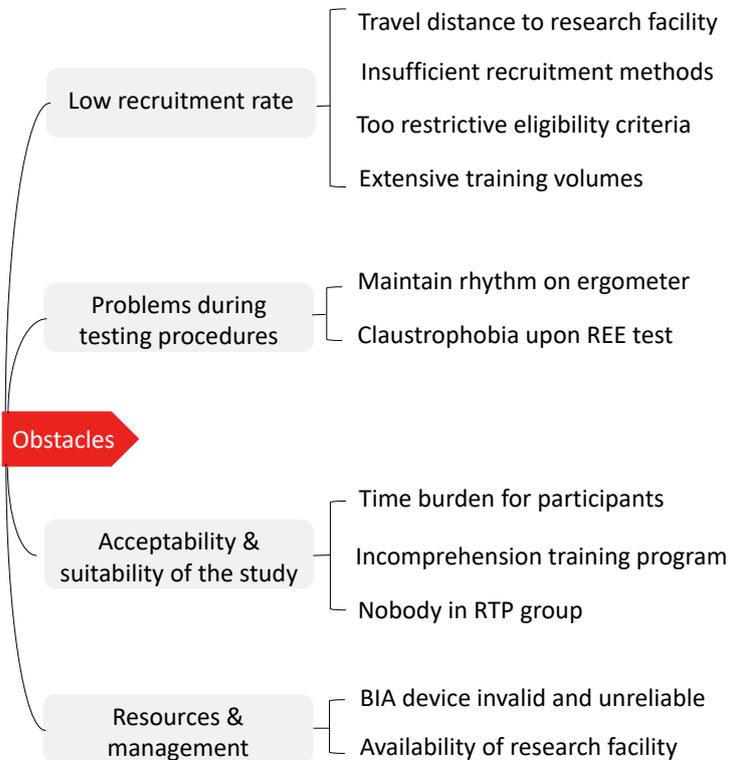
BUT

- Effect of exercise on REE in cancer population and healthy subjects?

## OBJECTIVE

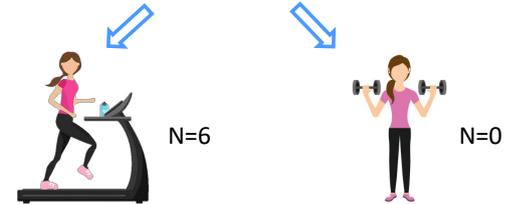
- To provide recommendations for a research protocol studying the effects of an aerobic exercise program (AEP) and resistance training program (RTP) on REE in healthy subjects

## RESULTS

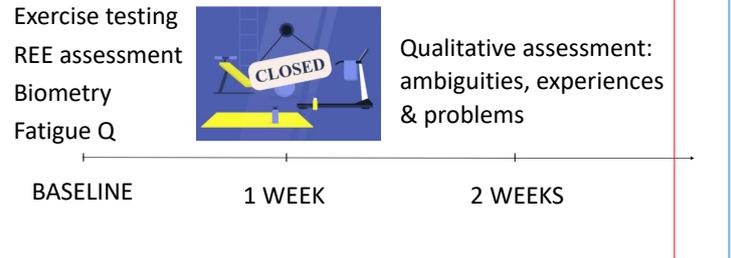


## METHODS

- Women aged 30 - 70 years without underlying conditions that
  - influence REE
  - impede execution of exercise program
- 8-week, telemonitored training program



- Primary outcomes: REE, FFM, fat mass
- Secondary outcome: fatigue (questionnaire)
- Timeline:



## CONCLUSION/RECOMMENDATIONS

- Recruitment
  - In proximity of research facility
  - Flyers, social media & target-group organizations
- Comprehension testing/training procedures
  - Familiarization sessions
  - Education through informative videos
- Acceptability & Suitability
  - Education and group sessions to enhance social support and make RTP more appealing
  - High intensity interval training to reduce time burden
- Resources
  - BodPod to measure body composition

# Looking into the brain of children with Developmental Coordination Disorder (DCD) during action observation using apparent biological motion

Vermiesch Femke<sup>1</sup>, Warlop Griet<sup>1</sup>, Deconinck Frederik JA<sup>1</sup>

(1) Department of Movement and Sport Science Ghent University

**Introduction:** Children with Developmental Coordination Disorder (DCD) have a neuromotor condition which causes problems executing coordinated movements. There is no clear understanding why the DCD population experiences these problems, however one hypothesis relates to the Mirror Neuron System (MNS). Neurons in the MNS are activated during both the execution and observation of movement. Recent research has shown that the brain also represents the periodicity of rhythmical movements. In the current study, we investigate this feature in children with DCD.

**Methods:** An apparent biological motion (ABM) task was executed by 7 typically developing (TD) children and 7 children with DCD. In the task, sequences of body statures were observed in two conditions: a fluent condition that showed a biological movement at 1,67 Hz and a non-fluent condition in which no biological movement at 1,67Hz could be detected. Condition-specific frequencies, related to the repetition of biological movements and the repetition of static postures were picked up by the EEG.

**Results:** The data of the TD and DCD group was compared for the fluent and non-fluent conditions. No differences in neural responses were found between the groups in both conditions. This suggests that children with DCD are equally capable of observing consecutive static postures and can recognize it as a biological movement.

**Conclusion:** In conclusion, this research shows that the brain of children with DCD represents the rhythm of a cyclic action sequence. They can translate the static postures into a biological movement. This finding suggests that action observation is useful as a tool to help the DCD children with motor learning and executing coordinated movements.

**Correspondence e-mail:** *femke.vermiesch@UGent.be*

# Looking into the brain of children with DCD during action observation using ABM

Vermiesch F., Warlop G., Deconinck F. J. A.

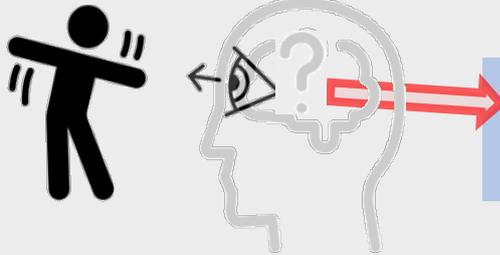
Department of Movement and Sports Science, Ghent University, Belgium



Children with Developmental Coordination Disorder (DCD) have a neuromotor condition which causes problems executing coordinated movements. There is no clear understanding why the DCD population experiences these problems, however one hypothesis relates to the Mirror Neuron System (MNS).

## MNS during Action Observation (AO)

- Neurons are activated during AO and movement.
- Consecutive static body postures are perceived as a movement.



**Children with DCD**  
? Ability to perceive a whole-body movement.



## Aim

The aim is to clarify the possible underlying deficit of DCD by comparing the brain activation of DCD and TD participants while watching apparent biological motion.



## Method



EEG  
Frequency tagging



7 TD  
7 DCD



Apparent biological motion (ABM)



5x  
Fluent



10 Hz  
10/6 Hz  
10/12 Hz

5x  
Non-Fluent



10 Hz  
10/12 Hz

## Results



10/6 Hz TD

=



10/6 Hz DCD

The EEG shows an equal representation of the 10/6 Hz frequency in the DCD group and TD group. 10/6 Hz is the frequency of the biological movement which is only presented in the fluent condition. This suggests that children with DCD can perceive the static body postures as a movement in the fluent condition and they can possibly use AO as motor learning tool.

### Referenties

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- 2 Lust, J. M., van Schie, H. T., Wilson, P. H., van der Helden, J., Pelzer, B., & Steenbergen, B. (2019). Activation of Mirror Neuron Regions is Altered in Developmental Coordination Disorder (DCD)-Neurophysiological Evidence Using an Action Observation Paradigm.
- 3 Orgs, G., Cracco, E., van Belle, G., Quenon, L., Patrick, H., & Rossion, B. EEG frequency-tagging of apparent biological motion dissociates action and body perception.

[Femke.vermiesch@UGent.be](mailto:Femke.vermiesch@UGent.be)



Universiteit Gent  
@ugent  
Ghent University

# Can the grade of proprioception deficit predict the used postural response strategy after perturbations in a population post-stroke?

Aerts Lissa<sup>1</sup>, De Block Liesel<sup>1</sup>, Buurke Tom<sup>1</sup>, De Groote Friedl<sup>1</sup>

(1) Human Movement Biomechanics Research Group, Department of Movement Sciences, KU Leuven, Leuven, Belgium

**Introduction:** Hip strategy and ankle strategy are the two main mechanisms of postural response people use to prevent themselves from falling after perturbations. Little is known about proprioception deficits of the hemiparetic side in post-stroke patients and whether it affects an individuals' post-stroke strategy to maintain standing balance. Here, we will gain insight into the link between the knee and ankle proprioception and the occurrence of hip and ankle strategy.

**Methods:** To collect standing balance control data participants with post-stroke hemiparesis stood on a CAREN platform while receiving perturbed forward and backward rotations and translations on both limbs. We collected proprioception data of all subjects via equilibrium scores on a Sensory Organization Test (SOT) and proprioception ratios on a Joint Position Matching (JPM) task.

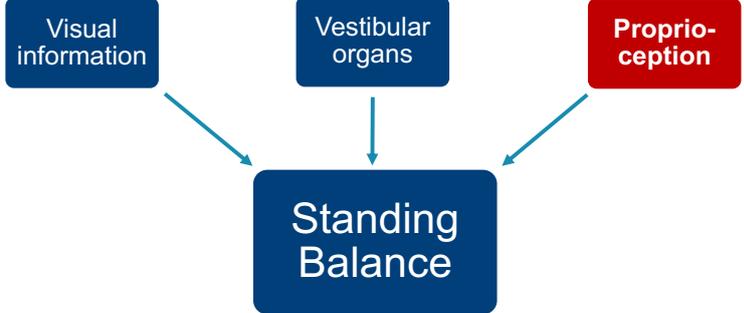
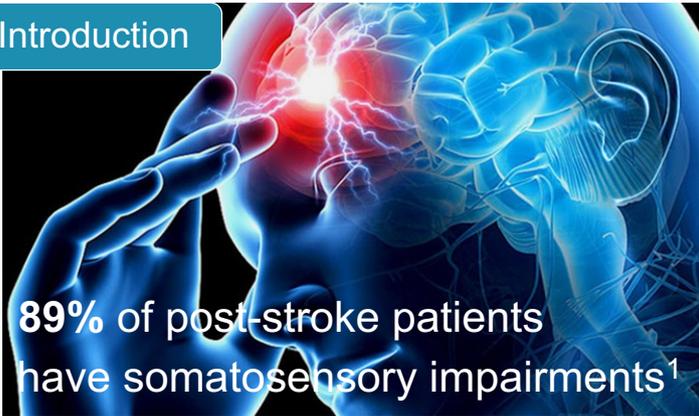
**Results:** We identified both postural strategies as the following: the ankle strategy was determined by evaluating the center of pressure (COP) within the base of support (BOS), the hip strategy was quantified based on higher maximal trunk lean angles. As people post-stroke have diminished balance control, they are more likely to prioritize stability (hip strategy) over minimizing effort (ankle strategy), especially when proprioception of the lower leg is compromised. After analyzing our results, we hope to find a significant link between proprioception score (knee and ankle) and the preference of strategy (hip and ankle) used by people post-stroke.

**Conclusion:** We suggest that our findings will reveal that proprioception scores are good indicators of the hip or ankle strategy utilized in patients' post-stroke. Insights in factors causing standing balance control deficits will advance our ability to reveal the patient-specific origin of reduced standing balance control. Such validation would pave the way to start targeted treatment strategies aimed at designing optimized post-stroke interventions.

**Correspondence e-mail:** [lissa.aerts@student.kuleuven.be](mailto:lissa.aerts@student.kuleuven.be); [liesel.deblock@student.kuleuven.be](mailto:liesel.deblock@student.kuleuven.be)

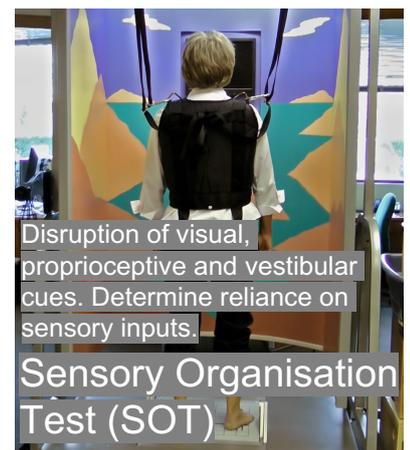
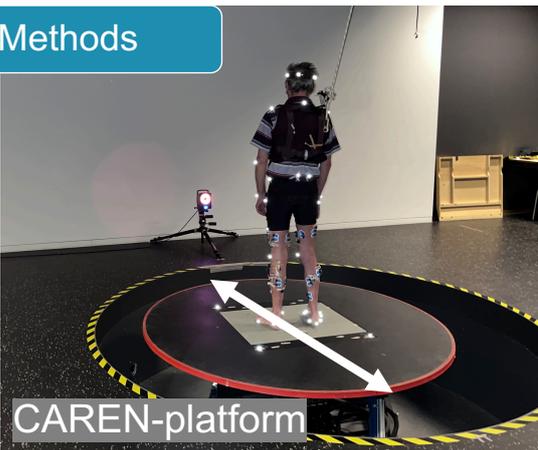
Can the grade of **proprioception** deficit predict the used **postural response strategy** after perturbations in a population post-stroke?

Introduction

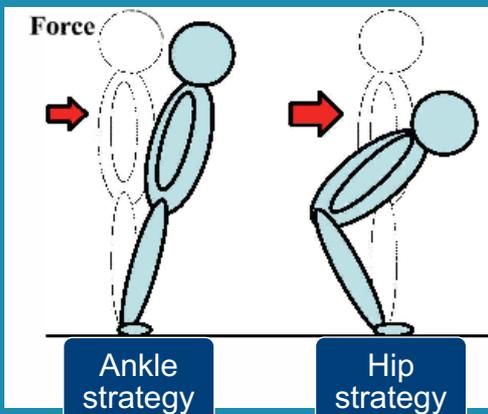


Aim: identify role of proprioception in standing balance, in a population post-stroke

Methods



Postural response strategy



Determined by evaluating the center of pressure (COP) within the base of support (BOS)<sup>2</sup>.

Quantified based on higher maximal trunk lean angles<sup>2</sup>.

Outcome variables

Standing balance	
Maximal trunk lean angle	Postural strategy: larger trunk lean → greater reliance on hip strategy
xCOM/BOS <sub>onset</sub>	Stability initial posture
xCOM/BOS <sub>300ms</sub>	Stability at transition
COP	Quantifies reliance on ankle strategy
Joint Position Matching (JPM)	
Proprioception ratio (PR)	$= \frac{\text{target} - \text{actual angle}}{\text{target angle}}$ for knee and ankle
Sensory Organisation Test (SOT)	
Equilibrium Scores (ES)	Eyes open and closed on firm surface
	Eyes open and closed on sway referenced support surface
	Eyes open on sway referenced support surface and surround

**Hypothesis:** Lower scores on ankle/knee proprioception are related with a diminished use of ankle strategy to maintain standing balance

# Differences in motivation and attitude toward organized sports according to age and sex during late childhood (9-12 years)

**Maréchal Cedric**<sup>1</sup>, Eva D'Hondt<sup>2</sup>, Lenoir Matthieu<sup>1</sup> and Coppens Eline<sup>1,2</sup>

(1) Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium; (2) Department of Movement and Sport Sciences, Vrije Universiteit Brussel, Brussels, Belgium.

**Introduction:** Organized Sports Participation (OSP) is associated with numerous health-related benefits, both on a physical and psychosocial level. Despite these benefits, the OSP rates seem to decline with increasing age, especially in adolescence. This decrease could be explained by several factors, like motivation and attitudes toward OSP. Therefore, the present cross-sectional study aimed to gain more insight in the differences in 9- to 12-year-old children's motivation and attitudes toward OSP according to age and sex. It was hypothesized that boys show more autonomous and controlled motivation than girls. Given the lack of existing evidence on differences in attitudes toward OSP between boys and girls in this age group, no specific hypotheses were formulated for this outcome.

**Methods:** 371 children (54% boys) aged between 9 and 12 years completed the Behavioral Regulation in Exercise Questionnaire and a newly developed questionnaire regarding their attitude toward OSP (single vs. multiple sports participation). A two-way MANCOVA was carried out to examine sex differences, while controlling for age in motivation and attitude toward OSP.

**Results:** At the multivariate level, a two-way MANCOVA revealed no significant sex effect on type of motivation (autonomous vs. controlled) or attitude (multiple sports vs. single sports;  $F=1.404$ ,  $p=0.232$ , partial  $\eta^2=0.015$ ). At the univariate level, differences in attitude toward multiple sports ( $F=5.089$ ,  $p=0.025$ , partial  $\eta^2=0.014$ ) were observed, with girls having a slightly higher attitude toward multiple sports when compared to boys. No significant sex differences were found for attitudes toward single sports ( $p=0.551$ ), controlled motivation ( $p=0.386$ ) or autonomous motivation ( $p=0.624$ ).

**Conclusion:** This study reveals that boys and girls have similar levels of motivation toward OSP, with higher autonomous motivation leading to more persistence in OSP when compared to controlled motivation. Additionally, girls seem to have a slightly higher attitude toward multiple sports participation than boys. Since previous studies revealed that multiple sports participation is beneficial for several physical and psychosocial outcomes, future studies should investigate how to motivate all children to participate in multiple sports.

**Correspondence e-mail:** [c.marechal@ugent.be](mailto:c.marechal@ugent.be)

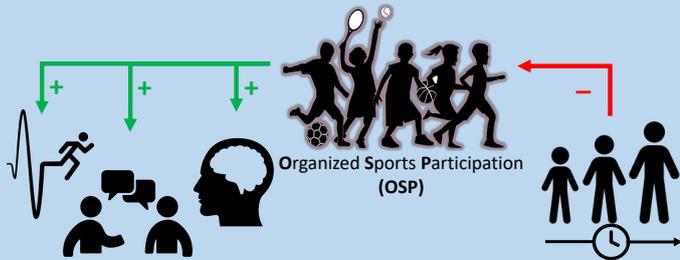
# DIFFERENCES IN MOTIVATION AND ATTITUDE TOWARD ORGANIZED SPORTS ACCORDING TO AGE AND SEX DURING LATE CHILDHOOD

Maréchal Cedric<sup>1</sup>, D'Hondt Eva<sup>2</sup>, Lenoir Matthieu<sup>1</sup> and Coppens Eline<sup>1,2</sup>

DEPARTMENT OF MOVEMENT AND SPORTS SCIENCES, GHENT UNIVERSITY, GHENT, BELGIUM (1)

DEPARTMENT OF MOVEMENT AND SPORT SCIENCES, VRIJE UNIVERSITEIT BRUSSEL, BRUSSELS, BELGIUM (2)

## Background



OSP is associated with physical [1] and psychosocial [2] benefits.

Yet, OSP rates decline with increasing age. Especially in adolescence! [3]

## Aim

To gain more insight in the differences in 9- to 12-year-old children's motivation and attitude toward OSP according to age and sex

## Hypotheses

- Boys show more autonomous and controlled motivation than girls [4]
- No specific hypothesis for attitude toward OSP between boys and girls

## Methods & Measures

- 371 children (54% boys)
- 9 – 12 years ( $11.06 \pm 0.95$ )
- Non-probability sampling approach
- During weekends and school breaks
- Data collection → **Questionnaires**



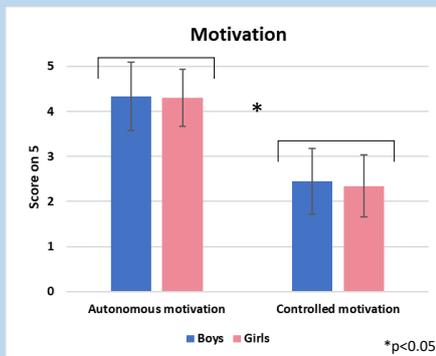
**Motivation**  
Behavioural Regulation of Exercise Questionnaire [5]

**Attitude**  
Attitude Questionnaire

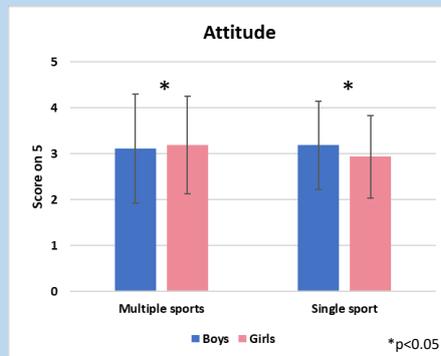
- Autonomous = intrinsic + identified
- Controlled = introjected + external

- Attitude toward multiple sports
- Attitude toward single sport

## Results



- Boys and girls do not differ in type of motivation
- Both boys and girls scored higher on autonomous motivation (4.39) than on controlled motivation (2.39)  
→ Leading to more persistence in OSP!



- Girls have a slightly higher attitude toward multiple sports ( $p=0.025$ ), while boys have a higher attitude toward single sport ( $p=0.012$ )



## Conclusion

- Children between 9-12 years (both boys and girls) show higher autonomous motivation than controlled motivation
- Girls are more interested in playing multiple sports
- Boys are more interested in playing one specific sport

## Take home message

Children are very well autonomously motivated, but we also have to focus on their attitude toward OSP and especially multiple sports, because it's beneficial for different physical and psychosocial outcomes.

→ How should we do that?

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- [4] De Meester et al. (2014) <https://doi.org/10.1186/1479-5868-11-48>
- [5] Sebire et al. (2013) <https://doi.org/10.1186/1479-5868-10-111>

## Contact

c.marechal@ugent.be  
www.ugent.be

Universiteit Gent

@ugent

Ghent University



SCAN MY ABSTRACT



# The inter-rater and intra-rater reliability of the Actual Aquatic Skills Test (AAST) for assessing young children's motor competence in the water

**Mertens Lisa**<sup>1</sup>, De Martelaer Kristine<sup>1</sup>, Sääkslahti Arja<sup>2</sup>, D'Hondt Eva<sup>1</sup>

(1) Research Unit on Movement and Nutrition for Health and Performance, Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel, Brussels, Belgium; (2) Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland.

**Introduction:** As children's actual aquatic skills are important for the prevention of drowning as well as their engagement in lifelong aquatic physical activity, researchers and practitioners should be able to assess this vital concept accurately and reliably. Therefore, this study aimed to investigate the inter-rater and intra-rater reliability of the Actual Aquatic Skills Test (AAST), consisting of 17 different test items for the assessment of young children's motor competence in the water.

**Methods:** Six raters received a training and evaluation session on scoring the AAST, after which five of them assessed four test videos (of various children performing the AAST test items) twice, with one to two weeks in between (i.e., test and re-test). Inter-rater and intra-rater reliability were determined per test video and for the different test items across videos using Gwet's Agreement Coefficient 2 (Gwet's AC2).

**Results:** The Gwet's AC2 for inter-rater reliability at the test varied from 0.414 to 1.000, indicating a moderate to perfect agreement between raters. For intra-rater reliability, it ranged from 0.628 to 1.000, demonstrating a good to perfect agreement between test and re-test scoring.

**Conclusion:** In conclusion, the AAST is a promising tool to reliably assess young children's actual aquatic skills in an indoor swimming pool.

**Correspondence e-mail:** [lisa.mertens@vub.be](mailto:lisa.mertens@vub.be)



# Inter-rater and intra-rater reliability of the Actual Aquatic Skills Test (AAST) for assessing young children's actual aquatic skill level



Lisa Mertens<sup>1</sup>, Kristine De Martelaer<sup>1</sup>, Arja Sääkslahti<sup>2</sup> & Eva D'Hondt<sup>1</sup>

(1) Vrije Universiteit Brussel, Brussels, Belgium; (2) University of Jyväskylä, Jyväskylä, Finland

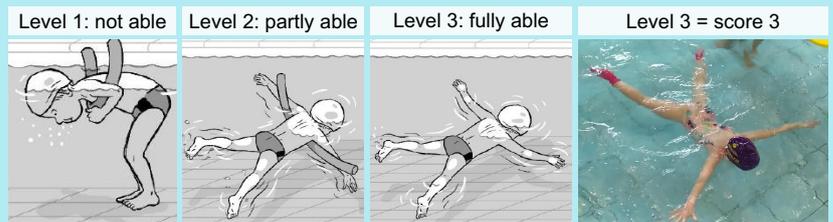
## 1. INTRODUCTION

- Young children's actual aquatic skill level is important for water safety and drowning prevention [1-3].
- Fundamental aquatic skills allow participation in water-based activities and sports, as part of a physically active lifestyle.
- Researchers and practitioners should be able to assess and monitor children's actual aquatic skill level in an accurate and reliable manner.
- However, current research (and practice) relies on self- or parent-proxy reports and focusses on swimming distance.

**STUDY AIM:** To investigate both inter-rater and intra-rater reliability of AAST as a new tool [4].

## 2. PSPWC & AAST

- AAST [4] is based on (and aligns with) **Pictorial Scale of Perceived Water Competence (PSPWC)** [5], developed for young children.
- AAST and PSPWC include 17 aquatic skill tasks/test items, essential for water safety and water-based activities.
- 3 levels per test item: 'level 1' as described in PSPWC, corresponded with 'score 1' on AAST.
- This study used videos (N=8) of children performing the AAST: 3 training, 1 evaluation and 4 test videos.
- Each video included all 17 test items, each item performed by a ≠ child.



Test item 6 (i.e., front star) of the PSPWC

Performance of test item 6 (AAST)

## 3. METHODS



### Legend

Gwet's AC2	Level of agreement
≤0.20	Poor
0.21-0.40	Fair
0.41-0.60	Moderate
0.61-0.80	Good
0.81-0.99	Very good
1.00	Perfect

### PSPWC/AAST test items

1. Move forward (as a crocodile)
2. Standing & submersion
3. Blowing bubbles under water
4. Catching object under water
5. Back star
6. Front star
7. Water entry: slide
8. Pushing from wall and gliding
9. Leg propulsion on back
10. Leg propulsion on front
11. Water entry: jumping
12. Water entry: diving
13. Water exit: climbing out
14. Vertically treading water
15. Longitudinal axis rotation
16. Transverse axis rotation
17. Sagittal axis rotation

## 4. RESULTS

Inter		Intra				
Gwet's AC2	Test video	Gwet's AC2 per rater				
		A	B	C	D	E
0.794	1	0.848	1.000	0.920	0.839	0.837
0.646	2	1.000	1.000	0.834	0.914	0.837
0.701	3	1.000	1.000	1.000	1.000	0.918
0.922	4	1.000	0.855	1.000	1.000	0.919

Gwet's AC2		Gwet's AC2 per rater				
Test item		A	B	C	D	E
1	1.000	1.000	1.000	1.000	1.000	0.660
2	1.000	1.000	1.000	1.000	1.000	1.000
3	0.507	1.000	0.673	1.000	1.000	0.660
4	1.000	1.000	1.000	1.000	1.000	1.000
5	0.671	1.000	0.719	1.000	0.673	1.000
6	0.414	1.000	1.000	0.660	1.000	1.000
7	0.713	1.000	1.000	1.000	0.719	1.000
8	0.835	1.000	1.000	0.719	1.000	1.000
9	1.000	0.628	1.000	1.000	1.000	0.628
10	0.634	0.644	1.000	1.000	0.660	1.000
11	0.863	1.000	1.000	1.000	1.000	1.000
12	0.777	1.000	1.000	1.000	1.000	0.628
13	0.702	1.000	1.000	0.673	1.000	0.719
14	0.657	1.000	1.000	1.000	1.000	1.000
15	0.806	1.000	1.000	1.000	1.000	1.000
16	0.780	1.000	1.000	1.000	1.000	0.719
17	0.828	1.000	1.000	1.000	1.000	1.000

## 5. CONCLUSIONS

### Inter-rater reliability

= agreement between raters

- Test videos: Good to very good
- Test items: Moderate to perfect
  - Lowest: Test item 6 (e.g., front star): need for scoring criteria regarding minimum duration & movement allowed during execution.
  - Second lowest: Test item 3 (e.g., blowing bubbles under water): likely due to the two-dimensional video recordings.

### Intra-rater reliability

= agreement between test and re-test

- Test videos: Very good to perfect
- Test items: Good to perfect

The AAST is a useful & reliable tool for assessing & monitoring young children's actual aquatic skill level. Need to translate this reliability study to a live administration & scoring of the AAST to confirm these positive results.

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## ACKNOWLEDGEMENTS

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- All 4 experts (Aldo Matos da Costa, Arja Sääkslahti, Boris Jidovtseff and Lisa Barnett) for assessing evaluation videos
  - All participating children & their parents
  - The 6 participating raters



[lisa.mertens@vub.be](mailto:lisa.mertens@vub.be)

# The effect of instructions regarding vertical oscillation on global running parameters in novice runners

Segers Veerle<sup>1</sup>, Fiers Pieter<sup>1</sup>, **Lecompte Laura**<sup>1</sup>

(1) Research Unit Biomechanics and Motor Control of Human Movement, Department of Movement and Sport Sciences, Ghent University, Ghent, Belgium,

**Introduction:** Current start-to-run (S2R) programs are not effective in reducing or preventing running related injuries (RRI) in a novice running population. Recent studies found that experienced runners with lower vertical oscillations of the centre of mass (COM) have reduced loading parameters linked to RRI's. Therefore, this research investigates the effect of verbal instructions on global running parameters (i.e. speed, stride frequency and vertical oscillation) at the beginning and end of a S2R program.

**Methods:** 26 novice runners followed a S2R program of 6 weeks. The intervention group (n=13) was instructed 'to move less up and down' according to a faded feedback design. The control group (n=13) was instructed 'to focus on their breathing' which acted as a sham instruction. Various running parameters such as vertical oscillation of the COM, running speed, step frequency, step length and heart rate were monitored during every running session via Garmin running dynamics. At the beginning and end of the S2R program, high speed video recordings were used to determine duty factor (DF) and running kinematics. We hypothesized that the instruction would both immediately as during the entire program lead to a reduction in vertical oscillation of respectively 10% and 15%, whereas speed would only be influenced for 10% and 5%.

**Results:** Prior to the S2R program, we invited 6 novice runners to the lab to explore the acute effect of different instructions on gait parameters. On average, instruction 'try to move less up and down' led to an increase in DF of 5,9%; instruction 'try to push-off with less force' to an increase in DF of 5,2% whereas the 'combi-instruction' increased DF for 8,39%. No significant changes were seen for both step frequency (SF) and step length (SL). The S2R program is still going on, so further results will be presented in the future.

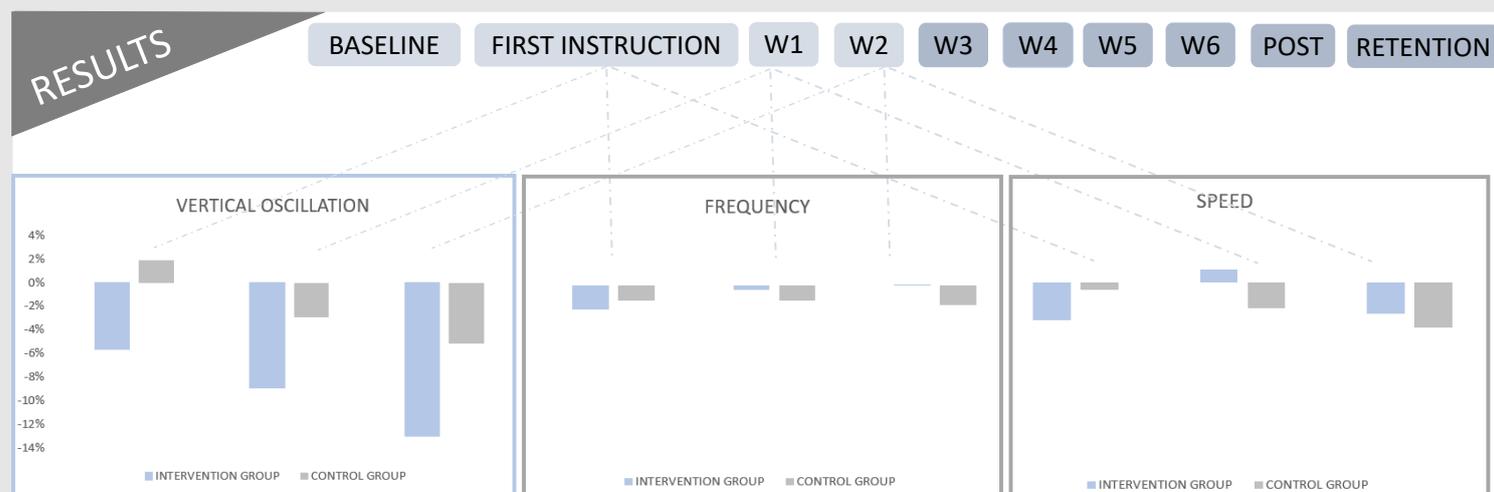
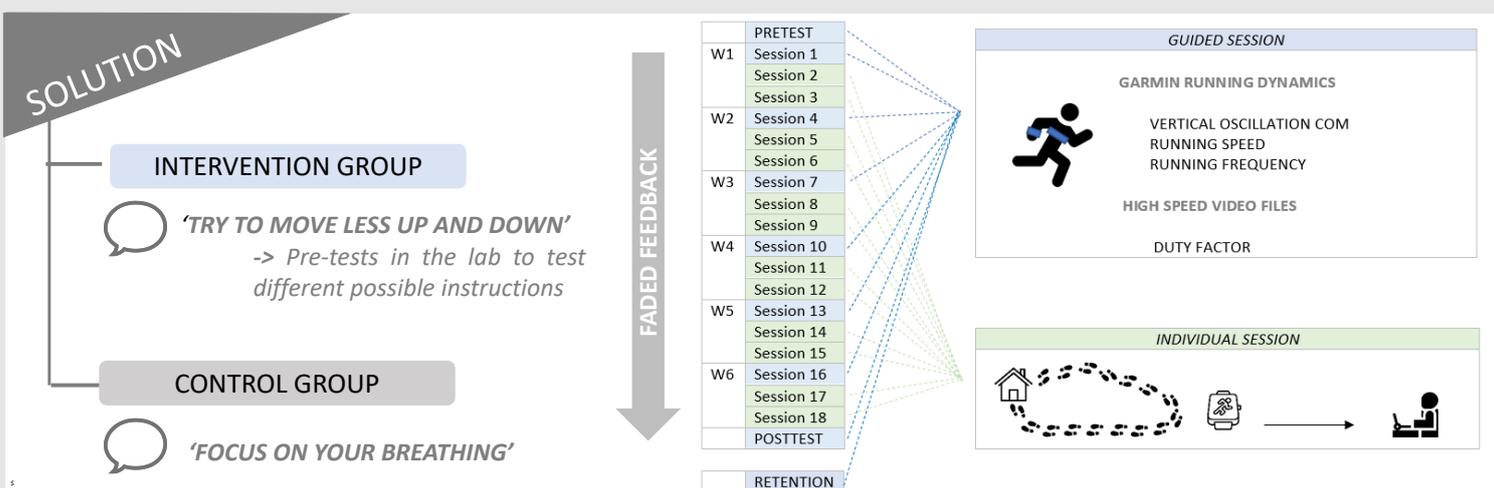
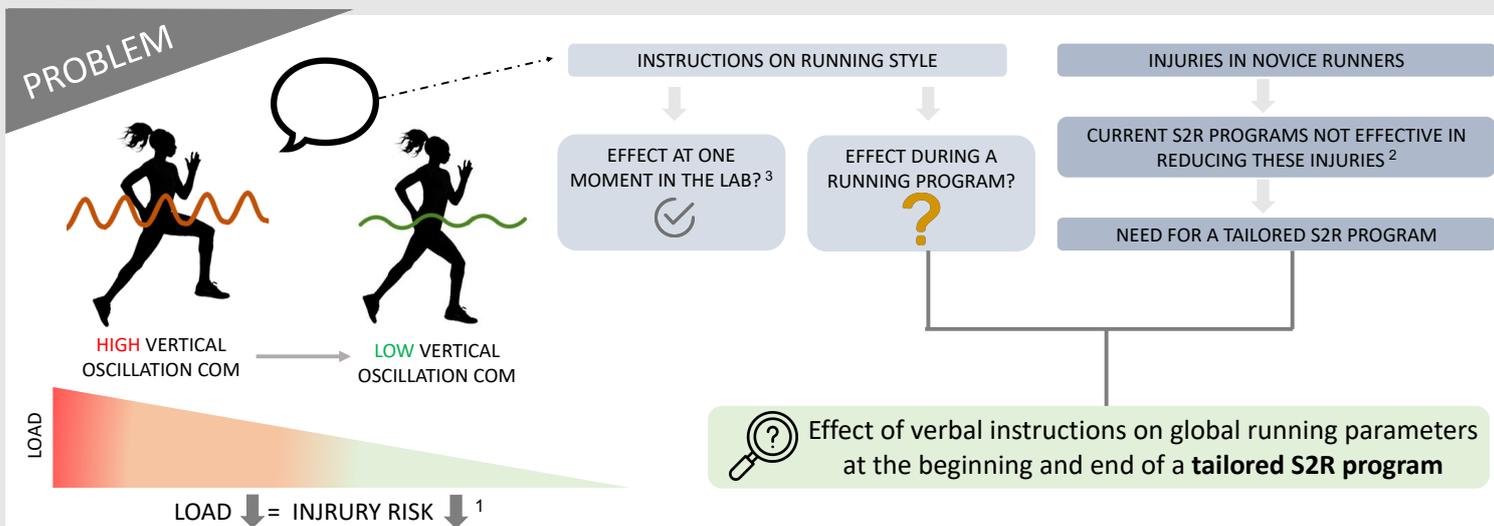
**Conclusion:** Klik of tik om tekst in te voeren.

**Correspondence e-mail:** [itlecomp.lecompte@UGent.be](mailto:itlecomp.lecompte@UGent.be)

# THE EFFECT OF INSTRUCTIONS REGARDING VERTICAL OSCILLATION ON GLOBAL RUNNING PARAMETERS IN NOVICE RUNNERS

Lecompte Laura <sup>1</sup>, Fiers Pieter <sup>1</sup>, Bonnaerens Senne <sup>1</sup>, Segers Veerle <sup>1</sup>

<sup>1</sup> Department of Movement and Sport Sciences, Ghent University, Belgium  
Research Unit Biomechanics and Motor Control of Human Movement



DECREASES IN VERTICAL OSCILLATION OF THE COM OVER THE FIRST WEEKS, WITHOUT BIG DIFFERENCES IN BOTH RUNNING SPEED AND FREQUENCY

HOPE THIS EVOLUTION WILL STILL CONTINUE ALSO WHEN THE AMOUNT OF INSTRUCTIONS KEEPS REDUCING

<MORE RESULTS ARE COMING SOON>

# A comparative study of skinfold measurements, bio-electrical impedance analysis and dual energy x-ray absorptiometry for estimating total, upper and lower segmental body composition in healthy young adults

D'Hondt Joachim<sup>1</sup>, Waterplas Jana<sup>1</sup>, Thiry Christophe<sup>1</sup>, Petroons Robin<sup>1</sup>, Chapelle Laurent<sup>1</sup>, Clarys Peter<sup>1,2</sup>, D'Hondt Eva<sup>1,3</sup>

(1) Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel, Brussels, Belgium; (2) Health, Design & Technology, Erasmus University College, Brussels, Belgium; (3) Department of Movement and Sports Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium

**Introduction:** Skinfold measurements, bio-electrical impedance analysis (BIA) and dual-energy X-ray absorptiometry (DXA) are commonly used non-invasive methods to estimate human body composition. This study aimed to compare the corresponding test outcomes from skinfold measurements, BIA and/or DXA for estimating total, upper and lower body composition (i.e., body fat percentage (%BF), fat mass, lean mass and/or bone mineral content (BMC)) in healthy young adults.

**Methods:** Body composition was assessed in eighty-three subjects ( $21.9 \pm 1.5$  years, 56% men) by means of skinfold measurements (with %BF being estimated using the sex-specific generalized equations of Jackson and Pollock and the Siri formula), BIA (Inbody S10) and DXA (Norland Elite). One-way Repeated Measures ANOVAs were used to determine differences in corresponding test outcomes according to body composition assessment method for men and women separately, while Pearson's  $r$  correlation coefficients were used to evaluate the strength of agreement between methods. The bias and 95% limits of agreement were calculated and graphically depicted using Bland-Altman plots.

**Results:** Skinfold measurements provided significantly lower total %BF compared to Inbody S10 BIA (men only:  $p < 0.001$ ) and Norland Elite DXA (both sexes:  $p < 0.001$ ). Additionally, BIA provided significantly lower total %BF and whole-body fat mass values (both sexes:  $p < 0.001$ ) together with higher whole-body lean mass values compared to DXA (both sexes:  $p < 0.001$ ). Only in men, BMC values were significantly higher as determined by BIA versus DXA ( $p < 0.001$ ). Regardless of sex, significantly higher arm lean mass values were observed using BIA compared to DXA ( $p < 0.001$ ), whereas higher leg lean mass values using DXA compared to BIA were only found in women ( $p < 0.001$ ). All correlations evaluating the strength of agreement between methods were found to be significant and moderate to very strong (with Pearson's  $r$  ranging from 0.61 to 0.97,  $p < 0.001$ ).

**Conclusion:** This study highlights (sex-dependent) differences in corresponding test outcomes between skinfold measurements, BIA and DXA both at the segmental and whole-body levels. Researchers and clinicians must weigh the purpose and practical considerations of their assessment need(s) against the limitations of the available assessment methods and devices for estimating human body composition.

**Correspondence e-mail:** [joachim.dhondt@vub.be](mailto:joachim.dhondt@vub.be)

# A comparative study of skinfold measurements, bio-electrical impedance analysis and dual energy x-ray absorptiometry for estimating total, upper and lower segmental body composition in healthy young adults

D'Hondt J., Waterplas J., Thiry C., Petroons R., Chapelle L., Clarys P., & D'Hondt E.

Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel



## Introduction

### BACKGROUND

- Knowledge of one's body composition is crucial:
  - Monitoring of health and athletic development/performance<sup>1</sup>
- Need for **valid, reliable and easily accessible** body composition assessment tools!
  - Skinfold measurements and bio-electrical impedance analysis (BIA) as portable alternatives to dual x-ray absorptiometry (DXA)
  - BUT: Level of Agreement (LoA) between (segmental) test outcomes remains unclear

### GAPS IN THE LITERATURE

- Research on the more recent and innovative devices/methods to assess body composition (e.g., InBody S10, Norland Elite DXA scanner) is limited, with the LoA between segmental body composition test outcomes being inconclusive

### AIM OF THIS STUDY

To compare both skinfolds measurements and BIA outcomes against DXA outcomes for total as well as upper and lower segmental body composition in healthy young adults

## Methods

### INCLUSION/EXCLUSION CRITERIA

- ✓**
  - 47 ♂ and 36 ♀
  - Young adults
  - 18-24 years
- ✗**
  - Based on standards of BIA/DXA protocol
  - Any disease or medical condition

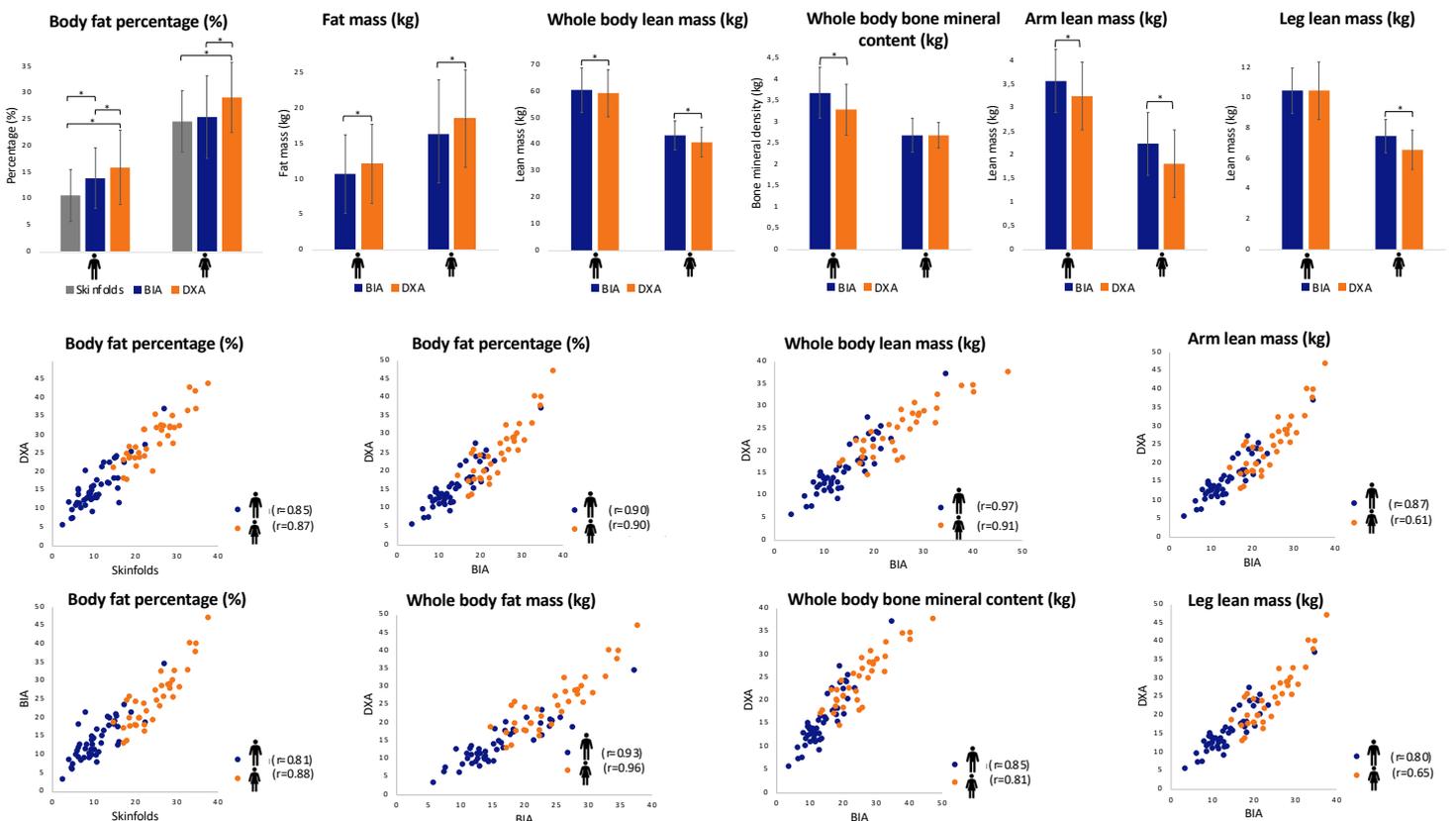
### PROCEDURES

- |                                                                                            |                     |                        |                     |                        |
|--------------------------------------------------------------------------------------------|---------------------|------------------------|---------------------|------------------------|
|                                                                                            | <b>&gt;&gt;&gt;</b> |                        | <b>&gt;&gt;&gt;</b> |                        |
| - Body fat percentage (via Jackson & Pollock <sup>2,3</sup> + Siri formulas <sup>4</sup> ) |                     | - Body fat percentage  |                     | - Body fat percentage  |
|                                                                                            |                     | - Whole body fat mass  |                     | - Whole body fat mass  |
|                                                                                            |                     | - Whole body lean mass |                     | - Whole body lean mass |
|                                                                                            |                     | - Bone mineral content |                     | - Bone mineral content |
|                                                                                            |                     | - Arm & leg lean mass  |                     | - Arm & leg lean mass  |

### STATISTICAL ANALYSIS

One-way Repeated Measures ANOVAs & Pearson's r correlation coefficients

## Results



## Conclusion

- ✓ First study to demonstrate:**
  - Significant differences between: Skinfold measurements – InBody S10 BIA – Norland Elite DXA
  - Except for: Bone mineral content in ♂ and Leg lean mass in ♀
  - Moderate to very strong correlations between test outcomes of these more advanced body composition assessment devices, but weaker correlation between BIA and DXA for Arm & Leg lean mass in ♂ compared to ♀ and Whole body lean mass
- ✓ Corresponding to previous research:**
  - Body fat percentage : Skinfolds < DXA
  - Body fat percentage and Whole body fat: BIA < DXA
  - Whole body lean mass: BIA > DXA
- ✓ TAKE HOME MESSAGE:**
  - InBody S10 BIA may be a useful portable alternative to the Norland Elite DXA for measuring Body fat percentage, Whole body lean mass as well as Arm & Leg lean mass (i.e., segmental body composition assessments, particularly in ♂)
  - Practitioners should weigh the practical considerations of their assessment with the limitations of the assessment method!

## Cited literature

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# Collagen supplementation has no additional beneficial effect against muscle and tendon damage compared to whey proteins

**Fache Laura**<sup>1</sup>, Seynaeve Maura<sup>1</sup>, Robberechts Ruben<sup>1</sup>, Poffé Chiel<sup>1</sup>, Ampe Noémie<sup>1</sup>, Hespel Peter<sup>1</sup>

(1) Exercise Physiology Research Group, Department of Movement Sciences, KU Leuven, Belgium

**Introduction:** Recent research demonstrated that collagen peptide supplementation induces similar positive effects on the recovery process after exercise as has been established for whey proteins.

**Methods:** Therefore, a randomized double-blind placebo-controlled parallel group design was conducted to investigate the effects of whey protein (WHEY) supplementation versus combined whey protein and collagen peptide supplementation (WHEY + CP) on muscle and tendon damage during a three-week unilateral eccentric training period. Twenty-two young male subjects participated in six training sessions per week in which three exercise modalities were performed; knee-extensions, one-leg squats and drop jumps. To investigate the acute and chronic effects of the supplementation protocol three experimental days were scheduled. On these days, muscular functional capacity was assessed by means of a counter movement jump (CMJ) test and isometric test of the knee extensors. In addition, integrity of the patellar tendon was assessed by ultrasonography and a blood sample was obtained to investigate markers involved in inflammation (IL-6) and collagen turnover (P1NP). Subjective patellar and muscular pain were assessed with the VISA-P questionnaire and a numeric rating scale respectively.

**Results:** Results revealed that the CMJ performance increased in both groups (WHEY+CP: +7.33%; WHEY: +6.47%), but there was no significant difference between the groups ( $p=0.84$ ). Isometric force did not increase, nor a significant difference was found between groups ( $p=0.64$ ). VISA-P scores slightly decreased during the trainings period from 97 to 85, but no group difference was detected. Ultrasonography revealed no changes in patella tendon integrity. P1NP increased with 11% in WHEY+CP and with 13% in WHEY ( $p=0.58$ ). IL-6 was not impacted by the training intervention or supplementation.

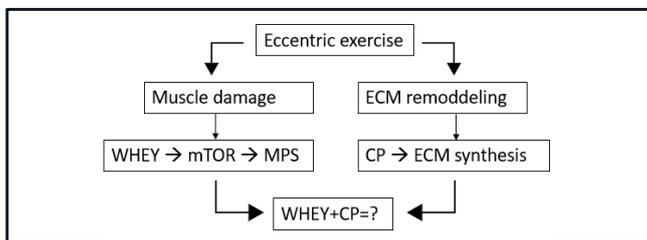
**Conclusion:** In conclusion, we can state that there is no additional beneficial effect of WHEY+CP supplementation compared to WHEY supplementation alone.

**Correspondence e-mail:** [laura.fache@student.kuleuven.be](mailto:laura.fache@student.kuleuven.be)

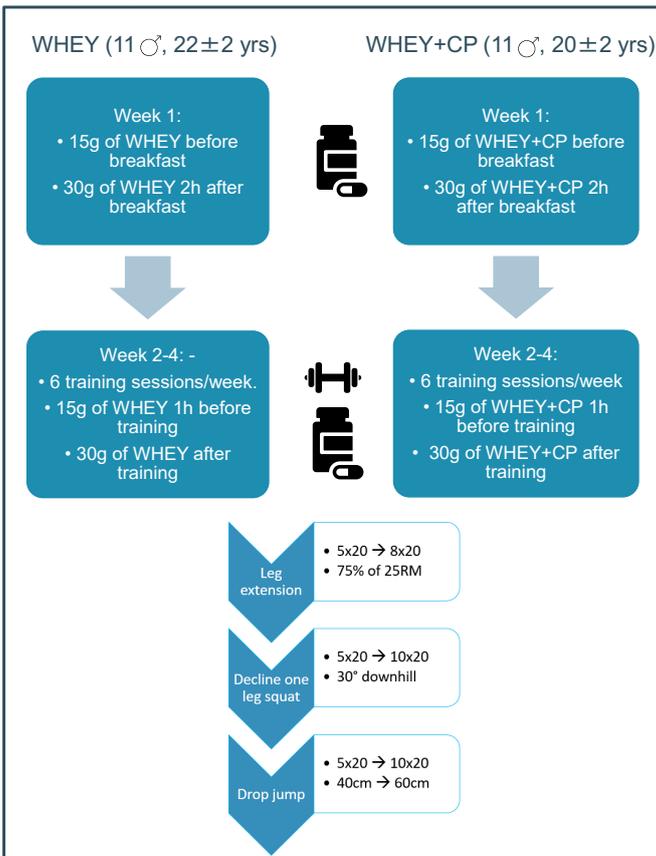
## Collagen supplementation has no additional beneficial effect against muscle and tendon damage compared to whey proteins alone

Fache, L., Seynaeve, M., Robberechts, R., Poffé, C., Ampe, N., Bogaerts, S., Hespel, P.

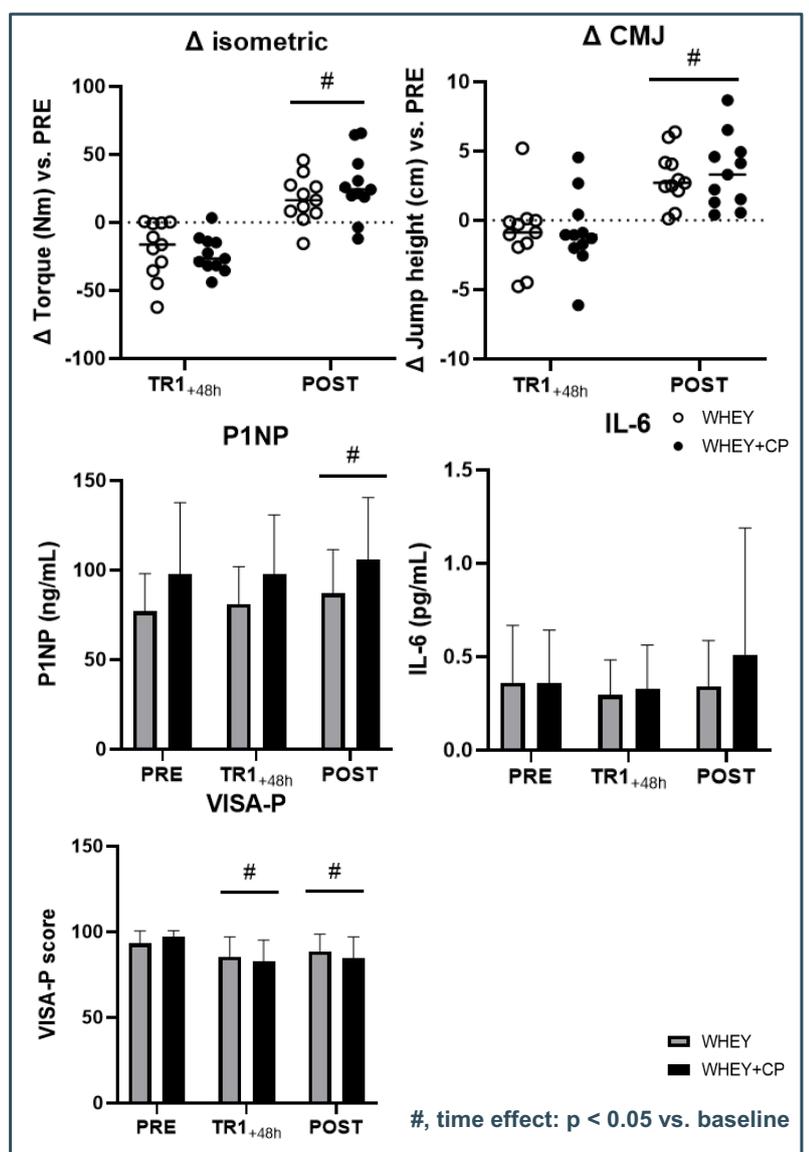
### Introduction



### Methods



### Results



### Conclusion

- No differences in functional capacity nor in markers of inflammation or collagen synthesis
- WHEY+CP has no additional beneficial effect compared to WHEY intake alone

# The effect of oral ketone ester supplementation on cognitive function during ultra-endurance exercise

Lauriks Wout<sup>1</sup>, Mermans Vincent<sup>1</sup>, Poffé Chiel<sup>1</sup>, Hespel Peter<sup>1</sup>

(1) Exercise Physiology Research Group, Department of Movement Sciences, KU Leuven, Belgium

**Introduction:** Recent data suggests that cognitive function may be positively impacted by elevated blood ketone levels. Hence, we hypothesized that exogenous ketosis caused by oral ingestion of ketone ester counteracts the decline in cognitive functioning induced by an ultra-marathon.

**Methods:** Twenty-four athletes with experience in long distance running aimed to complete a 100 km trail run (RACE). Before and during RACE they were given either ketone ester drinks (KE) consisting of (R)-3-hydroxybutyl (R)-3-hydroxybutyrate or placebo drinks (CON). The supplements were consumed before (25g), during (12.5g every 30 min) and after (25g) RACE. Cognitive function was assessed immediately before and after the trail run using two different tests; i.e., a reaction time test (RTT) and a rapid visual information processing task (RVP). Furthermore, muscle biopsies and both venous and capillary blood samples were taken. From the 24 subjects, 6 runners had to stop due to excessive pain following the muscle biopsy right before the start. The remaining 18 subjects ran till exhaustion and were included in the data analyses.

**Results:** When comparing KE with CON the average running distance (KE:  $89 \pm 15$ , CON:  $80 \pm 17$ ,  $p=0.26$ ) and running time (KE:  $10.8 \pm 2.4$ , CON:  $9.7 \pm 2.5$ ,  $p=0.35$ ) did not differ significantly. In CON, the number of false alarms in the RVP increased from 1 to 4 whereas they remained stable in KE ( $p<0.05$ ). The mean reaction and movement time increased by 18% and 41% respectively in CON but not in KE ( $p<0.05$ ). Moreover, plasma dopamine levels increased by 120% in KE but remained stable in CON ( $p<0.05$ ).

**Conclusion:** Oral ketone ester supplementation counteracts the reduction in cognitive functioning caused by an ultra-endurance event and increases plasma dopamine levels.

**Correspondence e-mail:** [wout.lauriks@student.kuleuven.be](mailto:wout.lauriks@student.kuleuven.be); [vincent.mermans@student.kuleuven.be](mailto:vincent.mermans@student.kuleuven.be)

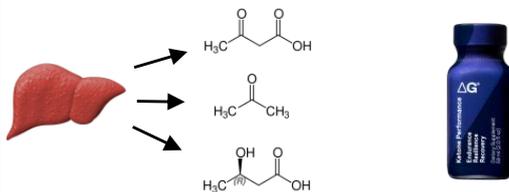
## Oral ketone ester supplementation improves cognitive function during ultra-endurance exercise

Lauriks Wout, Mermans Vincent, Poffé Chiel, Hespel Peter

Exercise Physiology Research Group, Faculty of Movement and Rehabilitation Sciences, KU Leuven, Belgium

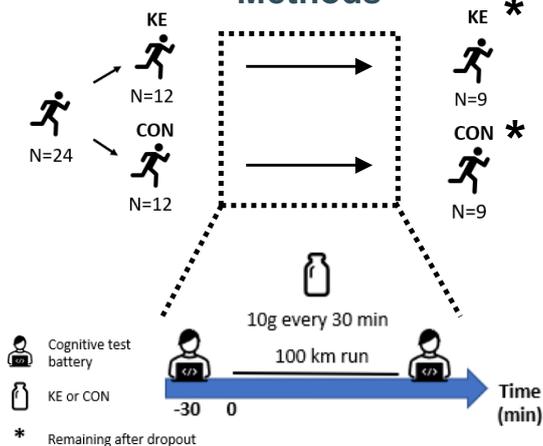
### Introduction

#### Ketone bodies:



- No effect on endurance exercise performance (1)
- ↑ cognition in obesity (2)
- ↑ cognition post exercise (3)
- Hypothesis:** KE counteracts decline in cognitive function induced by ultra-marathon

### Methods



Reaction time test (RTT)



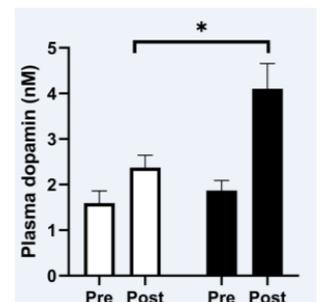
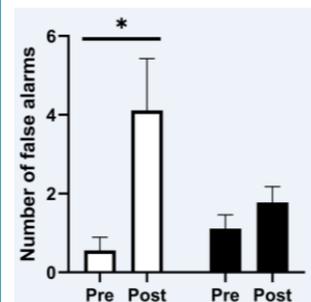
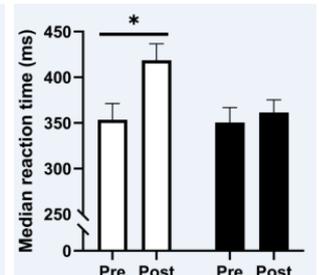
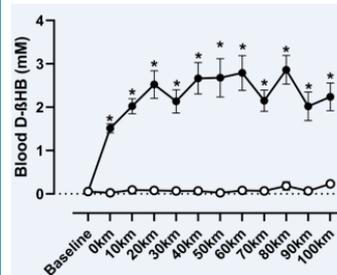
Rapid Visual information processing task (RVP)



### Results

\* Significant (p < 0,05)

CON  
KE



### Conclusion

KE ingestion

- ✓ Counteracts decrease in cognitive function following ultra-marathon
- ✓ ↑ dopamine concentration

### References

- (1) Poffé et al., Nature, 2020
- (2) Walsch et al., The journal of physiology 2021
- (3) Evans et al., Medicine and science in sports and exercise, 2018

# VLa<sub>max</sub>: innovation in training or work in progress?

Sablain Mattice<sup>1</sup>, Vermeire Kobe<sup>1</sup>, Boone Jan<sup>1</sup>

(1) Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium.

**Introduction:** The purpose of this study was to re-evaluate the reliability of the maximal glycolytic flux rate (VLa<sub>max</sub>) and compare these values before and after training sessions of different intensities. A second aim was to investigate the reliability of the calculated power at maximal lactate steady state (cPMLSS).

**Methods:** 13 participants performed 4 training sessions in a randomized order. These sessions consisted of a long slow distance, medium interval, high intensity and sprint interval training with an equal Lucia training impulse (TRIMP) load. VLa<sub>max</sub> was measured using a 15'' isokinetic cycling test before and 15' after the efforts. VLa<sub>max</sub> was measured as the difference between resting lactate pre and maximal lactate post isokinetic test divided by the lactic time interval. The cPMLSS was calculated using VLa<sub>max</sub> and the VO<sub>2max</sub> determined during a cycling step-protocol.

**Results:** Significant differences were found between pre and post VLa<sub>max</sub> measurements ( $0.55 \pm 0.11$ ;  $0.45 \pm 0.10$  respectively;  $p < 0.001$ ). VLa<sub>max</sub> values pre did not differ significantly between training sessions ( $p = 0.854$ ). Coefficients of variation (COV) from pre VLa<sub>max</sub> measurements varied strongly between subjects ranging from 4% to 14%. Further analysis on cPMLSS are in progress.

**Conclusion:** Conclusions on this topic will be made after finishing the analyses.

**Correspondence e-mail:** *mattice.sablain@UGent.be*

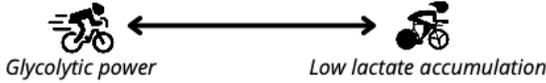
# VLAMAX : INNOVATION IN TRAINING OR WORK IN PROGRESS?

Sablain M,<sup>1</sup> Vermeire K,<sup>1</sup> Boone J<sup>1</sup>

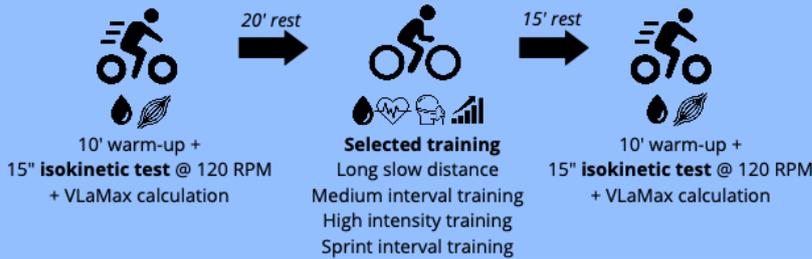
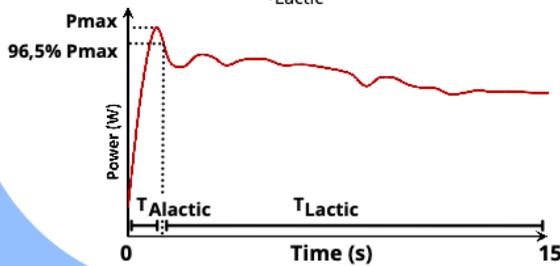
<sup>1</sup>Department of Movement and Sport Sciences, Ghent University, Belgium

## INTRODUCTION

- VLamax = maximal glycolytic flux rate



• Formula =  $\frac{(LaPost - LaPre)}{T_{Lactic}}$



## AIMS

- To determine the reliability of the VLamax before and after training sessions differing in intensity
- To determine the reliability of the calculated power at maximal lactate steady state (cPMLSS)
- To compare the cPMLSS using VLamax with the determined anaerobic threshold

## METHOD

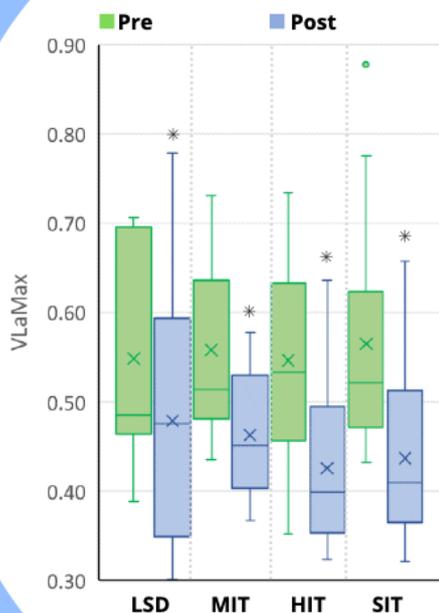


- n: 13 ♂
- Age: 27,5 ± 3,3
- Weight: 76,3 ± 5,8 kg
- Length: 182,2 ± 4,6 cm
- VO<sub>2</sub>max: 60,4 ± 5,8 ml.min<sup>-1</sup>.kg<sup>-1</sup>

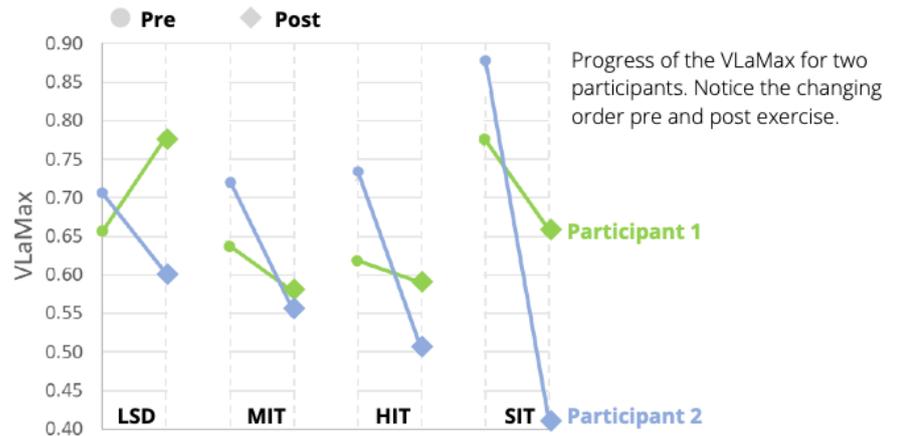


- Lactate (EKF, Biosen)
- Heart rate (Polar H10)
- Oxygen uptake (Jaeger Oxycon)
- Rate of perceived exertion (RPE 10, RPE 20)
- Power (Cyclus 2)

## RESULTS



\* = Significant difference between pre and post (p < 0.001)



Progress of the VLamax for two participants. Notice the changing order pre and post exercise.

- VLamax was significantly **higher** in the **pre** condition when compared to post
  - significantly **higher baseline lactate** values **pre** when compared to post
- No Significant difference in VLamax between training sessions
- **Pre VLamax** values had a **large coefficient of variation (COV)** of 4 to 14%
  - COV baseline lactate = 10-41%

## REFERENCES

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 Adam J, Öhmichen M, Öhmichen E, Rother J, Müller UM, Hauser T, Schulz H. Reliability of the calculated maximal lactate steady state in amateur cyclists.

## CONTACT

✉ mattice.sablain@UGent.be  
 📍 Universiteit Gent  
 📱 @UGent

# Comparison of methylome changes by strength training, in muscle tissue and PBMC.

Vercammen Bjarne<sup>1\*</sup>, Hendrix Arne<sup>1\*</sup>, Van Puyenbroeck Stef<sup>1</sup>, Thomis Martine<sup>1</sup>

(1) FaBeR, Department of Movement Sciences, KU Leuven, Leuven, Belgium

\*: equal contribution

**Introduction:** Exercise epigenetics is a research domain concerned with the complex interactions between exercise, epigenetics and cellular responses. Strength training-induced methylation modifications in muscle tissue DNA showed epigenetic muscle memory. Unfortunately, the determination of muscle methylome requires a needle biopsy, thereby limiting its biomarker potential. We compared strength-training induced methylome changes in muscle tissue DNA with those observed in DNA from peripheral blood mononuclear cells (PBMC). Epigenetic signature overlap between blood and target tissue has been demonstrated before in cancer, but remains understudied in exercise contexts.

**Methods:** Methylation data from a previously conducted study by Blocquiaux et al. (2021) was available in young (n=5, 22±2y) and old (n=6, 65±5y) male participants, for both DNA from muscle (M. Vastus Medialis) and blood samples, using the Infinium MethylationEPIC beadchip. Samples were taken in a training-detraining-retraining protocol. The present analysis focuses on the hypo- and hypermethylation effects of 12 weeks of whole-body resistance training. Quality control, filtering and normalisation were performed using the ChAMP EPIC pipeline in R. Differentially methylated CpG sites (DMPs: top 1000) were determined and Gene Set Enrichment Analysis (GSEA at p<0.05) was performed, with identification of overlap between both tissues.

**Results:** 10 blood-muscle overlapping DMPs (p<0.005) were found: cg0484136 (*SEC22B*), cg07285896 (*NDUFAF8*), cg01077566 (*HSPD1*), cg19305147 (intergenic region), cg19021318 (*TUBB*), cg16847041 (*PET112L*), cg03091851 (*ITIH5*), cg20090957 (*MAPAPK5*), cg18712973 (*ZNF560*) and cg08616760 (*ZNF354A*). All of them showed strength-training induced hypermethylation in both tissues, except for cg0916760 that was hypomethylated. GSEA showed that the differently methylated gene sets were mainly involved in the MAPK-, TGF-beta and DNA-Repair – pathways.

**Conclusion:** An exploratory analysis of the 1000 top ranked genome-wide DMPs showed limited overlap between muscle DNA and whole blood DNA as potential biomarkers for strength-training induced methylome changes. Methylation changes in MAPK-pathway genes are identified in both tissues. Follow-up analysis including other confounders are planned.

**Correspondence e-mail:** [Bjarne.vercammen@student.kuleuven.be](mailto:Bjarne.vercammen@student.kuleuven.be)/[arne.hendrix@student.kuleuven.be](mailto:arne.hendrix@student.kuleuven.be)

# Comparison of methylome changes by strength training, in muscle tissue and PBMC

## 1. Background

- Epigenetics → DNA expression regulation
- Histone modification, ncRNA & DNA Methylation ( $CH_3$ ) at CpG → hypo/hypermethylation
- Tissue specificity of methylome
- Physical activity → epigenetic changes
- Invasive muscle biopsy vs. accessible blood
- **? Biomarker capacity when blood DNA methylation changes correspond to those in muscle DNA**

## 2. Methods

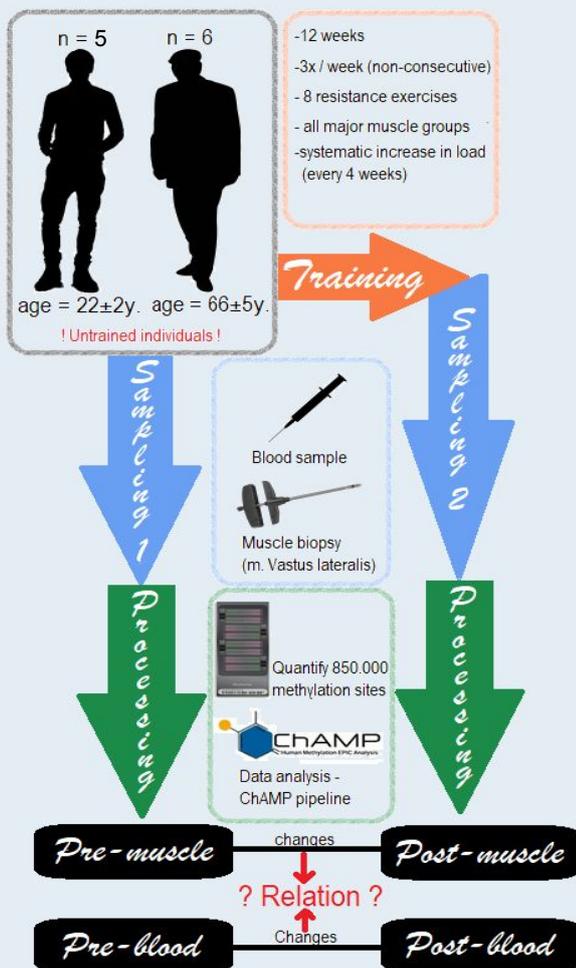


Figure 1: Sample, resistance training intervention and muscle/blood DNA methylation analysis flow. Analysis is focused on the training phase of the extended training/de-/retraining study of Blocquiaux et al.<sup>1</sup> Differential methylation analysis and Gene Set Enrichment Analyses were performed using the ChAMP<sup>2</sup> pipeline in RStudio.

## 3. Results

### Differentially Methylated Probes (DMP's)

= CpGs showing training induced hypo- or hyper methylation.

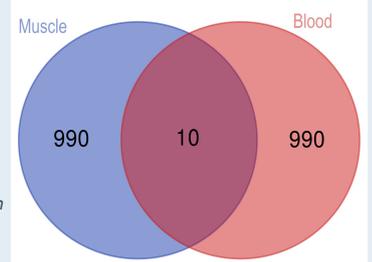


Figure 2: Venn diagram indicating overlap between top 1000 DMP's in muscle tissue and top 1000 DMP's in peripheral blood mononuclear cells (PBMC);

cg0484136\*, cg07285896\*, cg01077566\*, cg19305147\*, cg19021318\*, cg16847041\*, cg03091851\*, cg20090957\*, cg18712973\* & cg08616760\*. \*significant for blood and muscle (p<0.005).

### Methylation change in cg03091851 near ITIH5

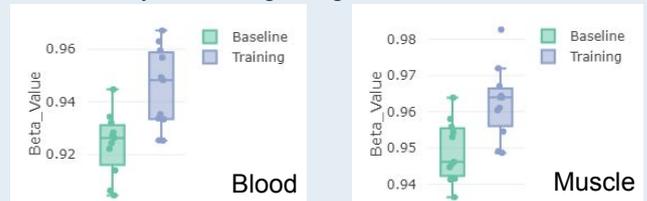


Figure 3: Methylation changes for cg03091851 near ITIH5 in blood (left) and muscle (right). Same pattern (hypermethylation) can be found for 8 other CpG's. Only cg08616760 shows hypomethylation. Beta-value 0 = unmethylated, 1= fully methylated.

### Gene Set Enrichment Analysis (GSEA)

=> biological pathways

- MAPK pathway
- TGF-beta
- DNA repair/ senescence



Figure 5: Venn diagram indicating overlap between the observed GSEA's in muscle (right) and blood (left), using the empirical bayes method.

## 4. Conclusion

1. Only 10 common CpG's are significantly different in blood and muscle after training. All present in different genes (*NDUFAF8*, *HSPD1*, *IGR*, *TUBB*, *ZNF354A*, *ZNF560*, *MAPKAPK5*, *ITIH5* & *GATB*).
2. These shared DMP's show similar directions of hypo/or hypermethylation change, which supports biomarker capacity.
3. Methylation changes in *ZNF354A* and *MAPKAPK5* seem to show promising biomarker capacity because of their function in the MAPK- and TGF-beta- pathways.
4. The genes *GATB*, *NDUFAF8* and *HSPD1*, which are related to mitochondrial adaptations, show overlap in blood and muscle tissue. Again demonstrating the blood-muscle link in exercise-induced methylation changes.

- **Low sample size**
- **Only males**
- **Exploratory nature of our investigation (top 1000 DMPs)**
- **Confounders not yet taken into account (age by SVD)**

## 6. References

1. Blocquiaux, S., Ramaekers, M., Van Thienen, R., Nielens, H., Delecluse, H., De Bock, K. & Thomis, M. Recurrent training rejuvenates and enhances transcriptome and methylome responses in young and older human muscle. *JCSM Rapid Communications* (2021) DOI: 10.1002/rco.252
2. Tian, Y., Morris, T. J., Webster, A. P., Yang, Z., Beck, S., Feber, A., & Teschendorf, A. E. (2021, 28 oktober). The Chip Analysis Methylation Pipeline. Bioconductor. Geraadpleegd op 30 november 2021, van <https://www.bioconductor.org/packages/develop/bioc/vignettes/ChAMP/inst/doc/ChAMP.html>

# Regulation of mechanosensors in skeletal muscle hypertrophy

Govaerts Jaro<sup>1</sup>, Rojo Ana Victoria<sup>1</sup>, Vanmunster Mathias<sup>1</sup>, Pacolet Alexander<sup>1</sup>, Suhr Frank<sup>1</sup>

(1) Exercise Physiology Research Group, Departement of Movement Sciences, KU Leuven, Leuven, Belgium

**Introduction:** Mechanosensors play a crucial role in proper force transmission and the maintenance of skeletal muscle, which has a direct influence on overall human health. However, their role in the process of hypertrophy still remains unclear and poorly understood. To improve our general understanding of mechanosensor's structure and function, we examined Integrin-linked kinase (ILK), Kindlin-2, YAP and Itgb1 in skeletal muscle tissue of mice.

**Methods:** Twenty-one mice were randomized in two groups of which the control group received no training (n=10), while the experimental group followed a resistance-training protocol (n=11). Western blotting and qPCR were used to identify the genetic expression of ILK, Kindlin-2, YAP and Itgb1. Further, the size of the muscle cells were examined by means of histology to assess hypertrophy.

**Results:** qPCR analysis showed no significant differences in the genetic expression of ILK, Kindlin-2, YAP and Itgb1 between the control and resistance training group. Further analysis of both western blotting and histology is still being performed.

**Conclusion:** Our study revealed no significant changes in the genetic expression of ILK, Kindlin-2, YAP and Itgb1. Whether the resistance training model induced hypertrophy in the mice will be determined later on.

**Correspondence e-mail:** jarogovaerts@hotmail.com

## Regulation of mechanosensors in skeletal muscle hypertrophy

Govaerts Jaro, Rojo Ana Victoria, Vanmunster Mathias, Pacolet Alexander & Suhr Frank

Exercise Physiology Research Group, Faculty of Movement and Rehabilitation Sciences, KU Leuven, Belgium

### Introduction

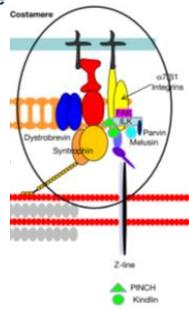
#### Mechanotransduction

= Cellular process where mechanical forces are detected and converted into biochemical signals inside the muscle fiber.  
→ Crucial for **optimal muscle fiber functioning**

#### Mechanosensors

= Protein complexes forming the **connection between the environment (ECM) and the muscle cell.**

- ILK
- YAP
- Itgb1
- Kindlin 2 (*Fermt2*)



#### Hypertrophy

- ↑ Size of individual muscle fibers
- Paired with multiple health benefits

#### Hypothesis

- ↑ Mechanosensor expression
- ↑ Cross-sectional area (CSA) & minimum feret (diameter)

### Methods



Isometric contractions → muscle hypertrophy

- 10 weeks
- Hanging time ↑ / 3 wks
- Max strength values: → Pre-, mid- and posttest



#### M. Biceps:

- **Western Blotting & qPCR** → Mechanosensor gene/protein expression
- **Histology** → Hypertrophy: minimum feret & CSA of cells

### Minimum feret & CSA of muscle cells

### Results

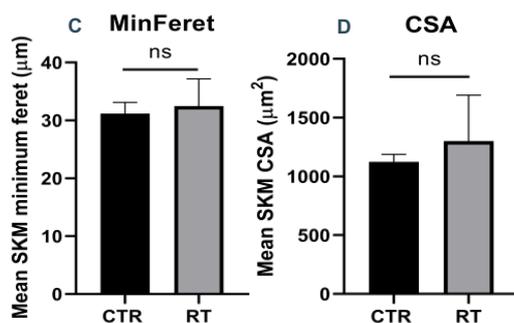
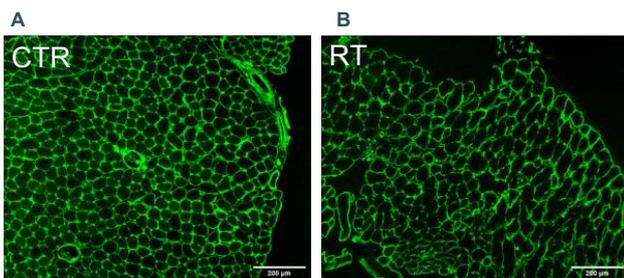


Fig. 1. Assessment of hypertrophy. (CTR=Control; RT= Resistance training.) (A) Immunofluorescence staining of laminin (green) of the M. Biceps of CTR 3 and (B) of RT 4. (c) The mean minimum feret was calculated for CTR 3, CTR 9, RT 4 and RT 6. (D) The mean cross-sectional area was calculated for CTR 3, CTR 9, RT 4 and RT 9. All scale bars: 200 μm.

### Gene expression:

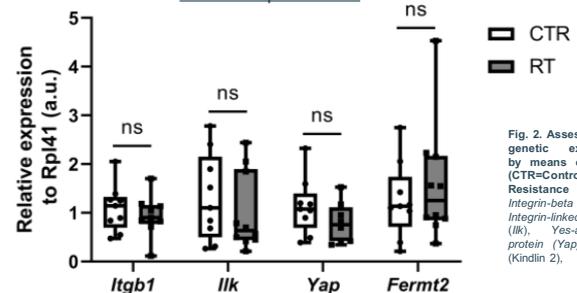


Fig. 2. Assessment of genetic expression by means of qPCR. (CTR=Control; RT= Resistance training.) Integrin-beta 1 (*Itgb1*), Integrin-linked kinase (*Ilk*), Yes-associated protein (*Yap*), *Fermt2* (Kindlin 2).

### Protein expression:

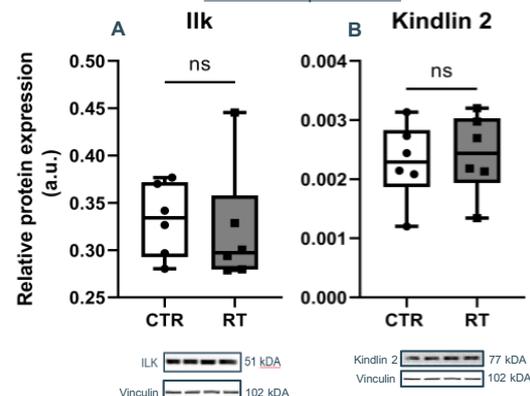


Fig. 3. Assessment of protein expression by means of Western blotting. (CTR=Control ; RT= Resistance training.) (A) Integrin-linked kinase. (B) Kindlin 2.

### Conclusion

- The training model **did not induce hypertrophy** based on the CSA and minimum feret.
- **No significant changes** were found in the genetic or protein expression of ILK, YAP, Kindlin 2 or Itgb1 in m. biceps.

### References

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- Samarel, A. M. Costameres, focal adhesions, and cardiomyocyte mechanotransduction. *American Journal of Physiology - Heart and Circulatory Physiology* 289, (2005).
- MATER METHODS 2012;2:114

# The relationship between duty factor and kinetic and kinematic measures related to running related injuries in recreational runners

Van der Meulen Lennert<sup>1</sup>, Fiers Pieter<sup>1</sup>, Bonnaerens Senne<sup>1</sup>, Segers Veerle<sup>1</sup>

(1) Research Unit Biomechanics and Motor Control of Human Movement, Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium

**Introduction:** Recreational runners use a variety of running styles which can be quantified by a number of parameters such as duty factor (DF) (stance time divided by stride time). Recent research showed that athletic runners who run with a DF above 50% experience lower musculoskeletal loading compared to runners who run with a DF below 50%. This study aims to expand this research by determining the relationship between DF and kine(ma)tic measures identified as risk factors for running related injuries in recreational runners.

**Methods:** 59 female recreational slow runners (preferred stride speed of  $2.39 \text{ m}\cdot\text{s}^{-1} (\pm 0.21)$ ) with an age between 35 and 55 ran overground at a running speed of  $2.30 \text{ m}\cdot\text{s}^{-1}$ . Three consecutive force plates and a motion capture system were used to calculate DF and detailed kinetics and kinematics. Joint angles, joint moments, joint moment impulses, vertical instantaneous loading rate (VILR), peak braking force (PBF), peak vertical ground reaction force (PVGRF) and the vertical displacement of the center of mass (COM) were determined. Duty factor was identified and used as criterion to reduce the data to a continuous uniform distribution. In this uniform distribution, 37 subjects were retained for further analysis. We hypothesize a negative relationship between DF and kinetic and kinematic measures.

**Results:** Subjects ran with an average DF of 46.97% ( $\pm 2.04$ ) and an inter-individual variation ranging from 41.94% to 51.65%. The average body weight and body height was 62.69 kg ( $\pm 14.74$ ) and 1.63 m ( $\pm 0.21$ ) resulting in a BMI of  $23.91 \text{ kg}\cdot\text{m}^{-2} (\pm 2.52)$ .

**Conclusion:**

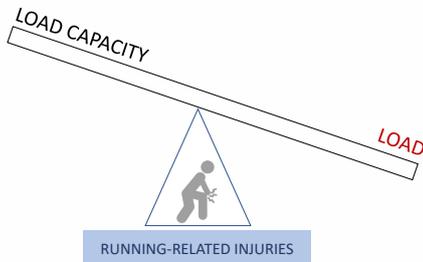
**Correspondence e-mail:** [lennert.vandermeulen@ugent.be](mailto:lennert.vandermeulen@ugent.be)

# The relationship between duty factor and kinetic and kinematic measures related to running-related injuries

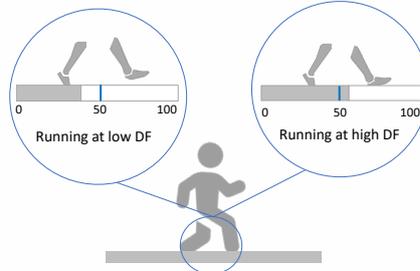
Van der Meulen Lennert<sup>1</sup>, Fiers Pieter<sup>1</sup>, Bonnaerens Senne<sup>1</sup>, Segers Veerle<sup>1</sup>

<sup>1</sup>Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium  
Research Unit Biomechanics and Motor Control of Human Movement

## INTRODUCTION

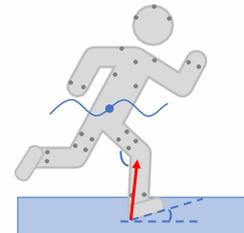


- Load > load capacity = Injury
- Less load → Injury risk ↓



- Duty factor (DF) = Stance time · Stride time<sup>-1</sup>
- Load at a DF of 41% > load at a DF of 51%

## Kine(m)atics



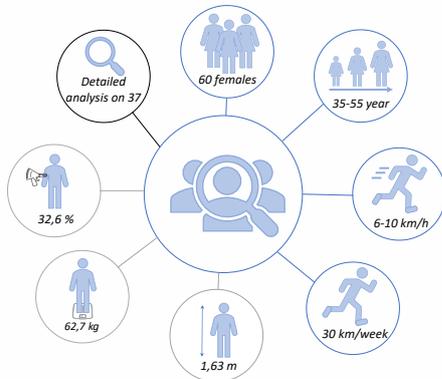
- Load depends on kinetics and kinematics
- Relationship between DF and kinetic and kinematic measures = ???

## AIM AND HYPOTHESE

- ⇒ Identify the relationship between DF and kinetic and kinematic measures related to running related injuries.
- ⇒ Negative relationship between DF and kinetic, kinematic and joint moment measures.

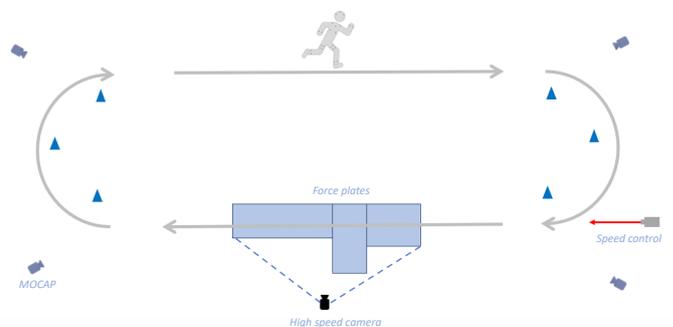
## METHOD

### SUBJECTS:

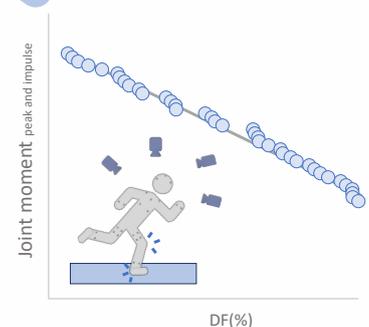
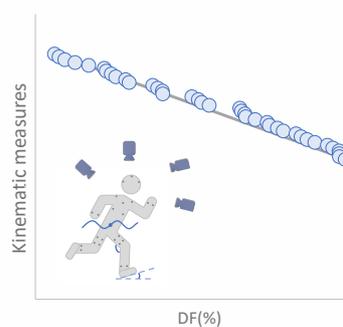
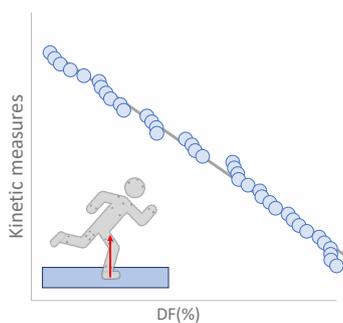


Inclusion criteria  
Characteristics

DESIGN: 5 min warm-up 3 min habituation Running at 2.3 m.s<sup>-1</sup>



## EXPECTED RESULTS



### REFERENCES

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Edwards, W.B. *Exerc Sport Sci Rev.* 2018, 46(4)  
Bertelsen et al. *Scand J Med Sci Sports.* 2017, 27(11)

### CONTACT

Lennert.vandermeulen@UGent.be

@UGent

Ghent University

Universiteit Gent

# Looking into the brain of children with developmental coordination disorder (DCD): An automatic imitation task

**Blonrock Lies<sup>1</sup>, Warlop Griet<sup>1</sup>, Deconinck Frederik J. A.<sup>1</sup>**

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

**Introduction:** Individuals with developmental coordination disorder (DCD) experience problems with motor learning and coordination, that affect their daily life quality. A deficit in the coupling between visual perception and motor action may underlie the motor problems in DCD. Learning movements is facilitated by action observation; observing an action triggers the motor network to execute the same action. The implication is that action observation can interfere with the action you want to perform, if the intended action is not compatible with the observation. This phenomenon is called ‘automatic imitation’. The main goal of this study was to investigate the direct effect of action observation within an automatic imitation task, to gain a better insight into the underlying mechanisms of DCD.

**Methods:** Seven children with DCD and seven typically developing (TD) children matched with the DCD group (age range: 10-14 years), participated in the study. While watching a computer display, they were instructed to lift their index finger or middle finger, in response to a visual cue (“W” or “M”, respectively). Simultaneously with the cue a hand on the screen performed a congruent, incongruent movement. Electro-encephalography (EEG) was used to register the brain activity of the child, executing the task. Stimulus-related potential P3 and reaction time (RT) were measured.

**Results:** For the RT, we saw an automatic imitation effect in both groups (i.e. larger RT in the incongruent conditions). The amplitudes of P3 in the DCD group were significantly smaller in comparison to the TD group.

**Conclusion:** The results indicate that the DCD group demonstrate an imitation effect like the TD group. Further, we assume the smaller amplitude in the P3 component can be an indication of impaired working in the social cognitive brain function within the DCD group.

**Correspondence e-mail:** *lies.blonrock@ugent.be*

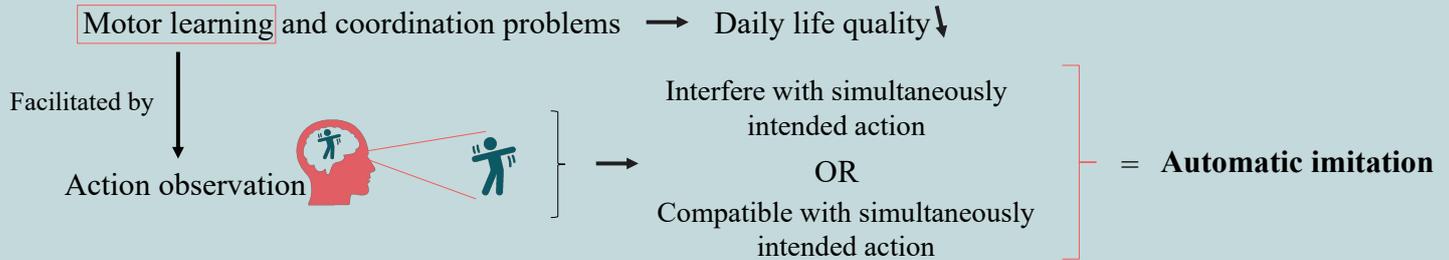
# LOOKING INTO THE BRAIN OF CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER: AN AUTOMATIC IMITATION TASK

Blontrock L., Warlop G., Deconinck F. J. A.

Department of Movement and Sports Sciences, Ghent University, Belgium

## INTRODUCTION

Developmental Coordination Disorder (DCD)



**AIM:** Explore neurophysiological differences between DCD and TD children within an automatic imitation task

## METHOD

### Participants

- 7 DCD
- 7 Matched Typically developing (TD) children
- Age range: 10-14

### Materials

- Response box
- Computer
- EEG-Apparatus

### Finger tapping task

Instruction

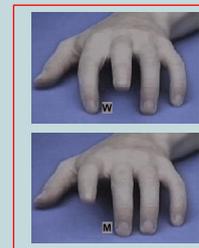
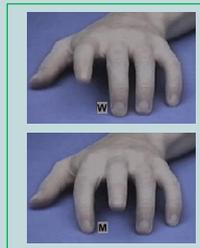
“Lift index finger”

“Lift Middle finger”

2 different conditions

Congruent condition

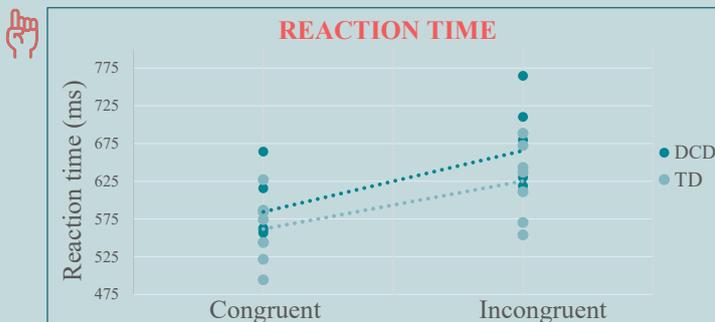
Incongruent condition



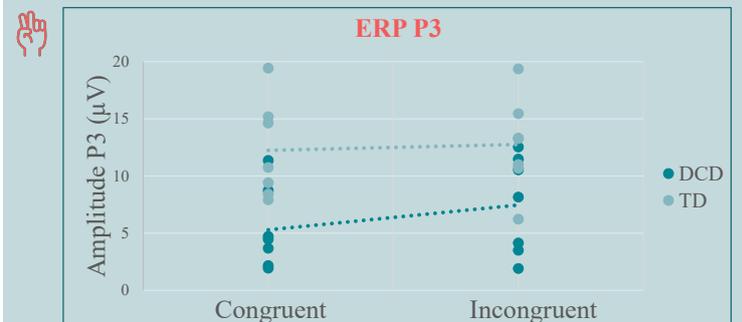
Parameters:

- Reaction Time
- ERP: P3 (Related to stimulus evaluation)

## RESULTS



- Imitation effect in both groups
- No sign. Relationship between RT both groups



- P3 DCD sign. Lower to P3 TD group in both conditions. ( $p < 0,05$ )

**CONCLUSION:** Based on the reaction times, an automatic imitation effect is found within the DCD group. Smaller cognitive processes related to action-perception (~P3) are found in the DCD group.

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### CONTACT

✉ Lies.blontrock@ugent.be  
 Facebook Universiteit Gent  
 Twitter @Ugent

# Fast interagation of new movements into pre-existing motor schema

**Bogaert Kaat**<sup>1,2</sup>, Reverberi Serena<sup>1,2</sup>, Dolfen Nina<sup>1,2</sup>, King Brad<sup>1,2,3</sup>, Albouy Genevieve<sup>1,2,3</sup>

(1) Department of Movement Sciences, Motor Control and Neural Plasticity Research Group, KU Leuven, Belgium; (2) Leuven Brain Institute, KU Leuven, Belgium ; (3) Department of Health and Kinesiology, College of Health, University of Utah, Salt Lake City, UT, USA

**Introduction:** Memory consolidation is defined as the process that stabilizes memory traces after initial acquisition, allowing them to move from short-term to long-term storage (Alvares, 1995). At the neural level, memory consolidation involves a slow and progressive transfer of memory representations from the hippocampus in the medio-temporal lobe (MTL) to frontal neocortical regions. In contrast to this standard model of consolidation, the schema model of memory consolidations suggests that new information can be rapidly learned when consistent to previously acquired knowledge (Tse et al., 2008). This new information would bypass the hippocampus and immediately be stored in the neocortex at first acquisition. The behavioural and neural correlates of the schema effect have been widely investigated in the declarative domain (e.g., Hennies, 2016; Havas, 2018), but analogous investigations in the motor memory domain are scarce and only include behavioural work (King et al., 2019). This goal of the current research was therefore to explore the neural correlates supporting the schema effect in the motor memory domain with the use of functional magnetic resonance imaging.

**Methods:** Young (18-30 yr) healthy participants will perform a bimanual serial reaction time task in two different sessions, on two consecutive days. During the first session, all participants learn the same motor sequence. During the second session, participant learn either a highly compatible or incompatible sequence to that learned in Session 1. During Session 2, fMRI data is collected.

**Results:** Data collection is ongoing. Preliminary behavioural results (N=10 participants) indicate that the previously reported motor schema effect was replicated in the MRI scanner. At the brain level, in line with previous literature in the declarative domain, we expect to find decreased hippocampal, and increased prefrontal activation during learning of new but compatible, as compared with incompatible, motor information.

**Conclusion:** The current study will provide new insights of the neural correlates supporting the schema effect in the motor memory domain.

**Correspondence e-mail:** [kaat.bogaert@student.kuleuven.be](mailto:kaat.bogaert@student.kuleuven.be)

# Fast interagation of new movements into pre-existing motor schema

## 1 INTRODUCTION

The schema effect is an alternative model of memory consolidation. It suggests that new information is rapidly learned when consistent with previously learned knowledge. Neurally, the new info is suggested to bypass the hippocampal short-term storage and be immediately assimilated into neocortical long-term storage sites.

### RESEARCH QUESTION

What are the neural correlates supporting the schema effect in motor sequence learning?

## 2 HYPOTHESES

### Behavioural

- Faster performance (lower reaction time) on new elements if presented in a compatible, compared with incompatible, motor sequence

### Neural

- New elements supported by neo-cortical activity in the compatible condition (fast **integration**, bypasses hippocampus)
- New elements in incompatible conditions will be supported by the hippocampus

## 3 METHODS

Pilot participants (N = 20); Projected study (N = 60)

### Inclusion

- Young (age 18-30)
- Healthy (no psychological/neural disorders)
- Regular sleep schedule

### Exclusion

- Smokers
- Musicians
- Contradictions fMRI



### Task and design

Motor sequence task

8 keys corresponding to 8 blocks on the screen

Session 1 outside scanner; Session 2 in MR scanner (mock for pilot)

### Analysis

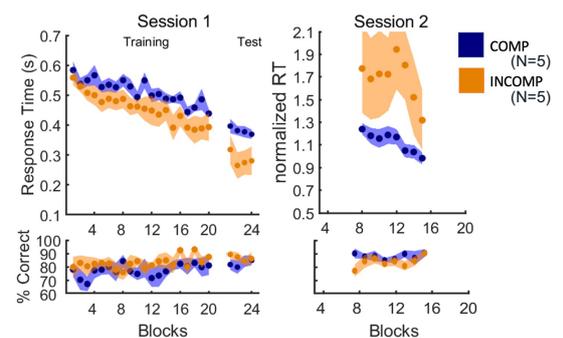
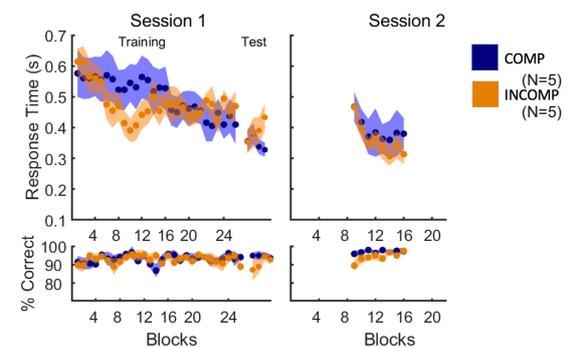
Multi-voxel pattern analysis (MVPA) of fMRI data collected in Ses2



SESSION 1							
Ordinal position							
I	II	III	IV	V	VI	VII	VIII
4	7	3	8	6	2	5	1

GROUP	SESSION 2							
	Ordinal position							
	I	II	III	IV	V	VI	VII	VIII
COMP	4	7	2	8	6	3	5	1
INCOMP	8	6	3	5	1	4	7	2

## 4 RESULTS



## 5 CONCLUSION

We performed two pilot studies to ensure replication of the schema effect at the behavioural level. In Pilot 1, participants performed a slow version of the task in both sessions: this did not result in schema development as evidenced by the lack of group effects in Ses2. In Pilot 2, participants performed the task full-speed in Ses1 and slowly in Ses2: this successfully replicated the schema effect. For the full study, we are using the design of Pilot 2, with Ses2 performed in the MR scanner. The goal of the study is to use fMRI to reveal neural substrates integration for the schema effect in motor sequence learning. Data collection is ongoing.

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**DEEL III**  
**Posterpresentaties**  
**PhD Studenten**

# The role of emotions in physical education outcomes by gender

**Sebastián Fierro-Suero<sup>1</sup>**

(1) Universidad de Huelva (Spain)

**Introduction:** During Physical Education (PE) classes, students can experience a wide range of emotional states. In the last years, research on emotions in PE is increasing due to their importance. The objective of this study, based on the Control Value Theory of Achievement Emotions (CVTAE), was to evaluate the relationships among achievement emotions and some outcomes in physical education (PE) taking into account the gender of students.

**Methods:** The sample was composed of 764 Spanish Secondary Education students (348 boys and 416 girls) with ages between 11 17 years ( $M = 13.12$ ,  $SD = 1.20$ ). The Achievement Emotions Questionnaire-PE was used to measure emotions. The intention to be physically active (IPA) and academic achievement in PE were the outcomes studied. Separate regression analysis was performed to find out if achievement emotions could predict the IPA and academic achievement by gender.

**Results:** Emotions explained 13% of the variance in the IPA ( $F(6,341) = 8.41$ ;  $p < .001$ ) for boys and 30% of the variance ( $F(6,409) = 29.26$ ;  $p < .001$ ) for girls. For academic achievement, emotions explained 15% of the variance for boys ( $F(6,341) = 9.84$ ;  $p < .001$ ) and 26% of the variance for girls ( $F(6,409) = 23.54$ ;  $p < .001$ ).

**Conclusion:** The results have shown the importance that achievement emotions play in predicting the IPA and academic achievement in PE classes. Moreover, this effect is bigger in girls than in boys. For that reason, PE teachers should focus on the emotions that girls feel during PE classes.

**Correspondence e-mail:** [fierro.suero@ddi.uhu.es](mailto:fierro.suero@ddi.uhu.es)

# The role of emotions in physical education outcomes by gender

Sebastián Fierro-Suero, Pedro Saéñz-López Buñuel, José Carmona, Bartolomé J. Almagro  
*Universidad de Huelva, Spain*



## INTRODUCTION

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## METHODS

The sample was composed of 764 Spanish Secondary Education students (348 boys and 416 girls) with ages between 11 17 years ( $M = 13.12$ ,  $SD = 1.20$ ). The Achievement Emotions Questionnaire-PE was used to measure emotions. The intention to be physically active (IPA) and academic achievement in PE were the outcomes studied. Separate regression analysis was performed to find out if achievement emotions could predict the IPA and academic achievement by gender.

## RESULTS



For boys, emotions explained 13% of the variance in the IPA ( $F(6,341) = 8.41$ ;  $p < .001$ ). The only emotion that significantly predicted the IPA in boys was enjoyment. For girls, emotions explained 30% of the variance in the IPA ( $F(6,409) = 29.26$ ;  $p < .001$ ). In this case, the emotions that played the most important role were pride and enjoyment.

For academic achievement, emotions explained 15% of the variance for boys ( $F(6,341) = 9.84$ ;  $p < .001$ ), anger being the only significant predictor. On the other hand, emotions explained 26% of the variance in academic achievement for girls ( $F(6,409) = 23.54$ ;  $p < .001$ ). Enjoyment and boredom were the emotions that played the most important roles in predicting academic achievement in girls.

Table 1. Comparisons between regression analyses by gender

	Boys				Girls		
	$R^2$	$sr^2$	$b$ (BCa 95% CI's)	$p$	$R^2$	$sr^2$	$b$ (BCa 95% CI's)
<b>IPA</b>	.13				.30		
1. Pride		.008	.11 (-.02, .24)	.08	.040	.26	.14, .40
2. Enjoyment		.019	.21 (.05, .38)	.01	.021	.22	.07, .37
3. Anger		.004	.10 (-.08, .29)	.31	.000	.00	(-.15, .15)
4. Anxiety		.006	-.08 (-.19, .02)	.13	.003	.05	(-.02, .12)
5. Hopelessness		.004	-.12 (-.38, .11)	.38	.016	-.20	(-.34, -.04)
6. Boredom		.000	.00 (-.15, .15)	.99	.004	.08	(-.04, .22)
<b>Academic Achievement</b>	.15				.26		
1. Pride		.002	.13 (-.14, .39)	.34	.002	.12	(-.11, .35)
2. Enjoyment		.007	.27 (-.02, .57)	.07	.016	.35	.12, .60
3. Anger		.024	-.54 (-.92, -.19)	.01	.000	-.03	(-.30, .26)
4. Anxiety		.002	-.10 (-.33, .11)	.37	.000	.01	(-.13, .15)
5. Hopelessness		.000	-.03 (-.58, .49)	.92	.009	-.27	(-.57, .01)
6. Boredom		.000	-.04 (-.30, .25)	.79	.014	-.29	(-.51, -.09)

Notes: IPA, Intention to be Physically Active;  $R^2$ , coefficients of determination;  $sr^2$ , squared semipartial correlations;  $b$ , regression weights; (BCa 95% CI's), bias corrected accelerated 95% confidence intervals;  $p$ , bootstrapped  $p$  values.

## CONCLUSIONS

The results have shown the importance that each achievement emotions play in predicting the IPA and academic achievement in PE classes by gender. Moreover, this effect is bigger in girls than in boys. For that reason, PE teachers should focus on the emotions that girls feel during PE classes.

Correspondence e-mail: fierro.suero@ddi.uhu.es



Universidad de Huelva

Facultad de Educación,  
 Psicología  
 y Ciencias del Deporte  
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# Attracting Generation Z into organized sport participation

Ricour Margot<sup>1</sup>, De Bosscher Veerle<sup>1</sup>, Willem Annick<sup>2</sup>, Scheerder Jeroen<sup>3</sup>

(1) Sport and Society Research Group, VUB, Brussels, Belgium; (2) Department of Movement and Sport Sciences, Ghent University, Ghent, Belgium; (3) Policy in Sports & Physical Activity Research Group, University of Leuven, Belgium

**Introduction:** Engaging more children and adolescents to lifelong sport participation should be the prevailing goal of countries given the physical, psychological, intellectual and social benefits it involves. However, sports clubs face increasing dropout rates starting at the age of 12 years. Also, physical activity levels of children and adolescents are alarming. This indicates that organize sport providers fail to provide an environment adapted to youth members leading to optimal experiences and lifelong sport participation. It can be argued that the difference between what adults offer and what youth members desire is attributed to a generation gap. A generation is a group in society born within same time period, having unique characteristics and attitudes, shaped by the social context and world events occurred during formative years. A new generation, referring to the people born after 1993, has been named Generation Z, Google generation, post-millennials or iGeneration. Hence, the current generation of youth members in sports clubs are classified as Generation Z and requires another approach. Literature around the effect of Generation Z on the organized sport is scarce. Also, before advocating for change, understanding the characteristics of Generation Z and investigation of their perspective is needed.

**Methods:** A survey was conducted in May 2021 targeting 6- to 18-years-olds (n=549).

**Results:** Children and adolescents prefer social media channels, rather than real life communication, to communicate with their sports club and coach. Additionally, the social network Instagram is preferred to follow activities and news from sports clubs.

**Conclusion:** Given that Generation Z is highly connected with technology and social media, and that social media and technology can lead to increase in physical activity levels, we claim that the dependence on technology and social media does not have to be the opponent of organized sport participation but can be the mean through which it is stimulated.

**Correspondence e-mail:** *margot.ricour@vub.be*

# GET TO KNOW THE NEW GENERATION Z

Margot Ricour<sup>1</sup>  
and  
Veerle De Bosscher<sup>1</sup>

<sup>1</sup> Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel

Participating in organized sport context involves benefits<sup>1</sup>:

-  Physical
-  Social
-  Intellectual - cognitive
-  Psychological - emotional



## GENERATION GAP IN ORGANIZED SPORT?

Adult organized sport providers

VS

Generation of youth members



**Dropout**, starting at age 12-13 years old<sup>1</sup>

Youth does not meet **physical activity** recommendations according to WHO<sup>1</sup>

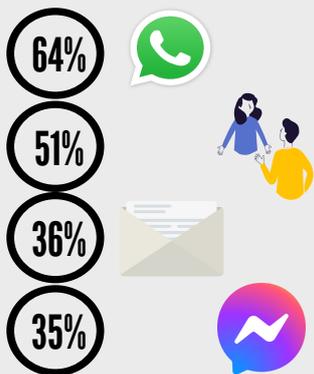
### Literature Gen Z:

- Scarce<sup>2</sup>
- Unique characteristics: social context and events during formative years<sup>1</sup>
- First: totally digital<sup>3,4</sup>
- Texting instead of direct communication<sup>3,4</sup>
- Social media / technology: increase physical activity levels<sup>5</sup>

**Survey**, for young adolescents (12-18 years old) to determine their preference to:

- Follow sports clubs (N=413)
- Communicate with the sports club (N= 387) and their coach (N=386)

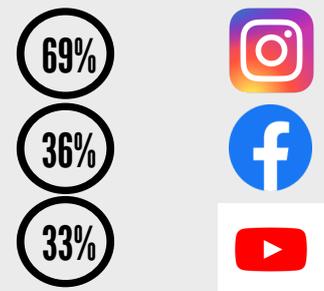
### Communication with coach



### Communication with sports club



### Following sports clubs



## Conclusion

**Use technology to attract and retain youth members in organized sport**

- Attract youth members with channels they prefer (Instagram, Facebook, Youtube)
- Sustain relations with youth members through their favourite form of communication

**Further research:** qualitative interviews



Margot Ricour

Vrije Universiteit Brussel

margot.ricour@vub.be

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# What did you expect? The role of athlete expectations in the relation between clarifying coach behavior and athletes' need satisfaction and frustration

Malisse Florian<sup>1</sup>, Van Meervelt Koen<sup>1</sup>, Van Puyenbroeck Stef<sup>1</sup>, Vande Broek Gert<sup>1</sup>

(1) KU Leuven, Department of Movement Sciences

**Introduction:** In sports, clarifying coach behavior plays a crucial role in optimizing athletes' need satisfaction (Delrue et al., 2019). Yet, research in organizational settings shows that clarifying behavior might lead to controlling perceptions and maladaptive outcomes (Vroom and Jago, 2007). Based on implicit leadership theory, followers have specific expectations about their leaders' behavior (Epitropaki et al., 2013). Congruence between these expectations and actual leadership behavior plays a crucial role in employees' perception of leadership behavior and leadership effectiveness (Wong & Giessner, 2018). As athletes' expectations are generally overlooked within coaching research, the present study aimed to test the effect of (in)congruence between athletes' expectations and actual coach behavior on athletes' need satisfaction and frustration. We hypothesized that when athletes' expectations about clarifying coach behavior were incongruent with coach-rated clarifying behavior, this would be related to lower need satisfaction and higher need frustration in athletes.

**Methods:** We sampled 28 coaches ( $M_{age} = 39.2$ ;  $SD_{age} = 8.6$ ) and 319 athletes ( $M_{age} = 21.9$ ;  $SD_{age} = 4.7$ ) from five different team sports (volleyball, basketball, handball, football, and korfbal), ranging from a regional to international level. Athletes' expectations about clarifying coach behavior, coach-rated clarifying behavior, athletes' need satisfaction and need frustration were assessed using questionnaires. To test the hypothesized (in)congruence effects, we used polynomial regression with response surface analysis.

**Results:** Our results confirm that when athletes' expectations about clarifying coach behavior are incongruent with coach-rated clarifying behavior, this is related to lower need satisfaction and higher need frustration in athletes.

**Conclusion:** Besides supporting existing findings on the benefit of clarifying coach behavior, the current findings show that clarifying coach behavior can also be detrimental for athletes' need satisfaction when this behavior is not in line with their expectations.

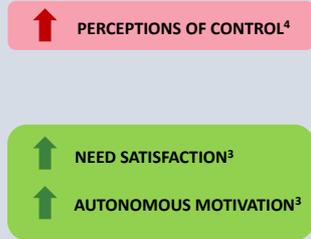
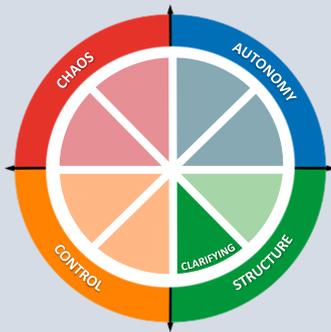
**Correspondence e-mail:** [florian.malisse@kuleuven.be](mailto:florian.malisse@kuleuven.be)

## What did you expect? The role of athlete expectations in the relation between clarifying coach behavior and athletes' need satisfaction and frustration

Malisse, F., Van Meervelt, K., Van Puyenbroeck, S. & Vande Broek, G.

### INTRODUCTION

#### THE EFFECTIVENESS OF CLARIFYING COACH BEHAVIOR



#### ORGANIZATIONAL SETTING – IMPLICIT LEADERSHIP THEORY<sup>1</sup>

- Followers have implicit expectations of ideal leadership behaviors<sup>1</sup>
- These expectations influence perceptions of leadership behavior & leader effectiveness<sup>5</sup>
- Incongruence between leader initiating structure needed and received is related to low levels of trust in the supervisor, job satisfaction and affective commitment to the organization<sup>2</sup>

#### HYPOTHESIS



### METHODS

#### SAMPLE

- 28 sport teams: Volleyball, football, basketball, handball & korfbal
- 28 coaches ( $M_{age} = 39.2$ ;  $SD_{age} = 8.6$ ) 96% 4%
- 319 athletes ( $M_{age} = 21.9$ ;  $SD_{age} = 4.7$ ) 68% 32%

#### MEASURES

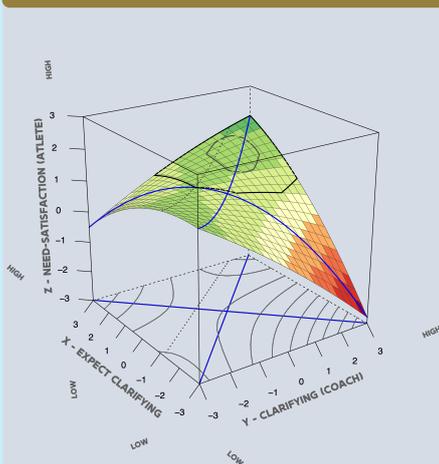
- Clarifying coach behavior (CBIS-Q) – 6 items
- Athlete expectations for clarifying coach behavior – 6 items
- Basic psychological need satisfaction need frustration scale<sup>3</sup> – 12 items

#### ANALYSIS

Polynomial regression with response surface analysis

### RESULTS

#### NEED SATISFACTION



#### CONCLUSIONS

- ≈ CONGRUENCE
  - Higher need satisfaction
  - Lower need frustration
- ≠ INCONGRUENCE
  - Lower need satisfaction
  - Higher need frustration

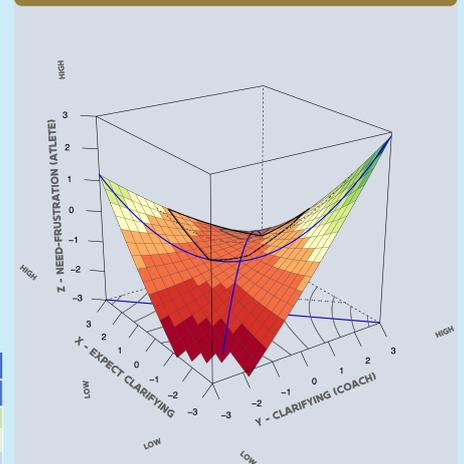
#### NEED SATISFACTION

Parameter	Value	p
$a_1$	0.077	0.846
$a_2$	0.100	0.408
$a_3$	-0.384	0.129
$a_4$	-0.282	0.005*
$a_5$	0.041	0.638

#### NEED FRUSTRATION

Parameter	Value	p
$a_1$	0.367	0.337
$a_2$	-0.231	0.044*
$a_3$	0.283	0.190
$a_4$	0.372	0.000*
$a_5$	-0.004	0.956

#### NEED FRUSTRATION



### DISCUSSION

#### TAKE HOME MESSAGE

- Clarifying coach behavior might be (in)effective depending on the (in)congruence between athlete expectations and coach behavior.
- Considering athlete expectations might be crucial when coaches aim to optimize athletes' need satisfaction and frustration.

#### FUTURE RESEARCH

- Investigate these relations in a larger and more diverse sample.
- Study the dynamic nature of athlete expectations and coach behavior.

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# Brain plasticity in patients with lateral ankle sprain and chronic ankle instability: a systematic review

**Maricot Alexandre**<sup>1,2</sup>, Dick Emilie<sup>1</sup>, Walravens Annemiek<sup>1</sup>, Pluym Bert<sup>1</sup>, Verschueren Jo<sup>1</sup>, Tassignon Bruno<sup>1</sup>, Meeusen Romain<sup>1</sup>.

(1) Vrije Universiteit Brussel, Belgium; (2) Luxembourg Institute of Research in Orthopedics, Sports Medicine and Science, Luxembourg

**Introduction:** Research investigating LAS and CAI has essentially focused on local adaptations. Recently, growing evidence is supporting the hypothesis neural plasticity occurs at both the spinal and cortical levels following (repeated) ligamentous ankle injury. These alterations might explain persisting dysfunctions, an increased injury risk, and the increased probability of developing CAI. This systematic review synthesizes the literature on brain plasticity following LAS and CAI.

**Methods:** Studies eligible for this systematic review investigated the brain with direct outcomes measures in patients with LAS or CAI. The following electronic databases were used for the systematic search from their conception to 19/10/2021: Pubmed, Web of Science, Embase, Scopus, PEDro, The Cochrane Central Registry for Controlled Trials (CENTRAL) and SPORTDiscus. Three authors independently screened 1227 articles from 7 databases using a two-staged process to include 15 studies. The quality assessment tool for observational and cross-sectional studies was used for the risk of bias assessment. The authors extracted and summarised relevant outcomes from each study in table 1.

**Results:** Patients with LAS showed lower superior cerebellar peduncles (white matter microstructure) compared with healthy controls. CAI populations displayed an increased sensitivity of intermediate inhibitory neurons and a decreased sensitivity of excitatory neurons in the corticospinal pathway. They also found more variability in cortical activation in the superior parietal lobe, pre-and postcentral gyrus and the supplementary motor area with lower corticomotor excitability in several lower limb muscles in patients with CAI.

**Conclusion:** Whilst these findings may support the hypothesis of brain plasticity in patients with ligamentous ankle injuries, all studies were retrospective in nature and most used different measurement methods which makes direct comparisons difficult and limits the strength of evidence of this review. Future research should focus on the understanding of the underlying neurophysiological mechanisms.

**Correspondence e-mail:** [alexandre.maricot@vub.be](mailto:alexandre.maricot@vub.be)



## Background

Research investigating LAS and CAI has essentially focused on local adaptations. Recently, growing evidence is supporting the hypothesis neural plasticity occurs at both the spinal and cortical levels following (repeated) ligamentous ankle injury. These alterations might explain persisting dysfunctions, an increased injury risk, and the increased probability of developing CAI.



## Objective

This systematic review synthesizes the literature on brain plasticity following LAS and CAI.



## Datasources

To 19/10/2021

- Pubmed
- Web of Science
- Embase
- Scopus
- PEDro
- The Cochrane Central Registry for Controlled Trials (CENTRAL)
- SPORTDiscus



## Eligibility criteria

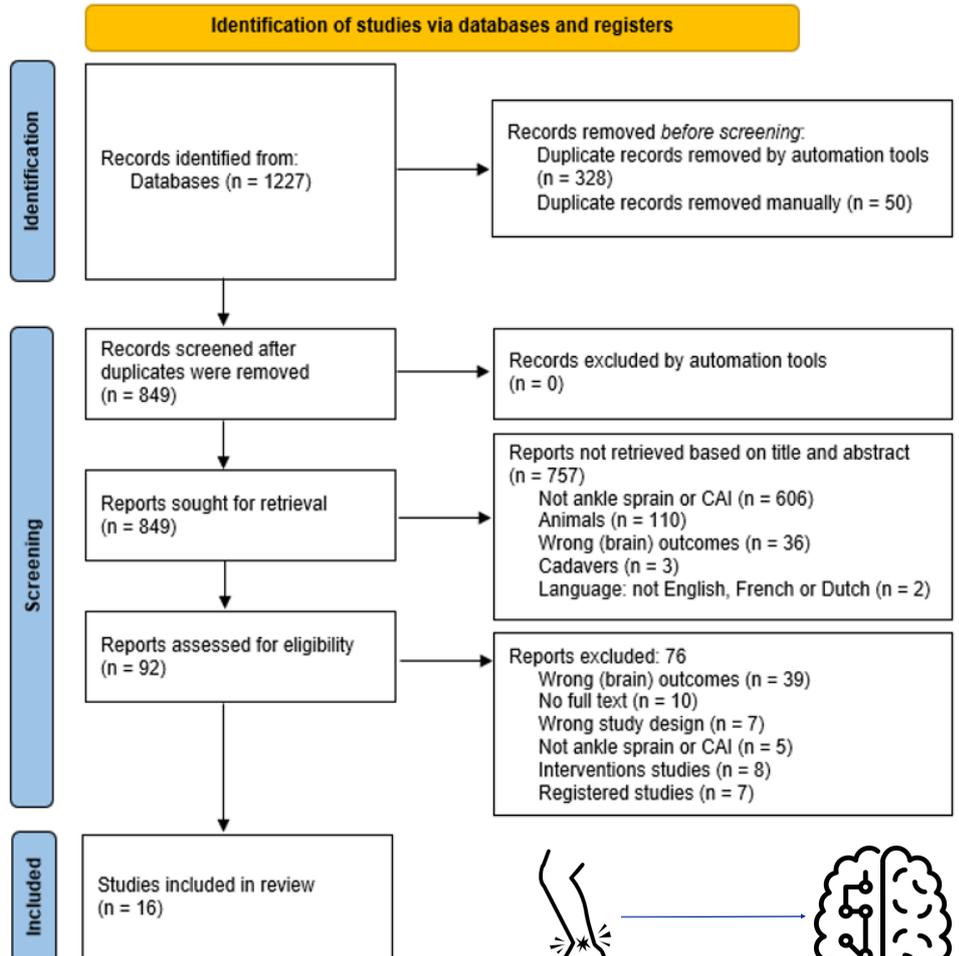
Types of studies eligible for this systematic review investigated:

- (1) The **brain** with direct outcomes measures.
- (2) And patients with (acute) **LAS** or **CAI** aged 18 years old or older

Articles were excluded based on:

- (1) **Study design**: meta-analysis, systematic reviews and narrative reviews
- (2) Or if **interventions** were used to evaluate brain plasticity,

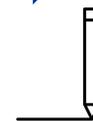
- **↑ Sensitivity** of intermediate inhibitory neurons
- **↓ Sensitivity** of excitatory neurons in the corticospinal pathway.
- **↑ variability** in cortical activation in the superior parietal lobe, pre-and postcentral gyrus and the supplementary motor area
- **↓ Lower corticomotor excitability** in several lower limb muscles
- Our findings support the hypothesis that brain plasticity occurs in patients with LAS and CAI.
- Existing literature has not yet been able to identify the level of cortical reorganisation and improvement in functional outcomes that can appear in CAI patients.



## Results

- **1227** articles - **7** databases – **3** authors
- Two-staged screening process

➔ **15** included studies.



## Conclusion

# The public expectations for female athlete role models: a Belgian investigation on gender equity in sport

Descheemaeker Kari<sup>1</sup>, Gielens Eva<sup>1</sup>, Van Roey Aline<sup>1</sup>, De Bosscher Veerle<sup>1</sup>, Derom Inge<sup>1</sup>

(1) Vrije Universiteit Brussel

**Introduction:** Increasingly, (inter)national sport associations stress the importance of gender equality in elite sports. Although there is a growing consensus amongst academics that well-known elite athletes are viewed as athlete role models (ARMs), society traditionally tends to gravitate more toward male athletes than female athletes. Meier (2015) concluded that people also tend to have more requirements for female athletes than male athletes. Insights on how people observe athletes, female ARMs in particular, remain limited in Europe. Therefore, in order to address the gap in literature, the following research questions are posed: RQ1: To what extent are Belgian citizens a fan of female Olympians? RQ2: To what extent are Belgian Female Olympians regarded as personal role models? RQ3: Which characteristics are attributed to popular Belgian female Olympians? RQ4: Which exemplary behavior or actions should female Olympians display in the eyes of the Belgian public?

**Methods:** A representative sample of the Belgian population was questioned before and after the Olympic Games 2021. In total 4000 Belgian citizens have filled out the survey.

**Results:** In August 2021, 35% of the surveyed Belgians indicate being fan of a Belgian Olympic athlete. 67% of Belgians with a favorite elite athlete chose a female athlete. Almost one in two Belgians who chose a female athlete as their number one announces that this athlete is also a role model for them. Belgians who chose a female Olympian as their favorite athlete have significantly more often expectations about the behavior of the athlete than those who chose a male athlete as their favorite. The Belgian population expects female athletes to be actively involved in inspiring the younger generation.

**Conclusion:** We can conclude that, in line with the literature, female athletes are more often expected to give back to society than male athletes.

**Correspondence e-mail:** *kari.descheemaeker@vub.be*

# The public expectations for female athlete role models: a Belgian investigation on gender equity in sport

Descheemaeker Kari, Gielens Eva, Van Roey Aline, De Bosscher Veerle and Derom Inge

Department of Movement and Sport Sciences, Faculty of Physical Education and Physiotherapy, Vrije Universiteit Brussel

## Introduction

- Elite athletes are viewed as role models<sup>1</sup>
- 'Gendered heroism': fewer female athletes are being recognized<sup>2,3</sup>
- People tend to have more requirements for female athletes than male athletes<sup>4</sup>
- Insights from Europe are limited<sup>5</sup>

In order to pursue gender equity in elite sports, it is valuable to understand how people perceive female elite athletes.



## Methods



4000 Belgians



Before and after Tokyo Olympic Games



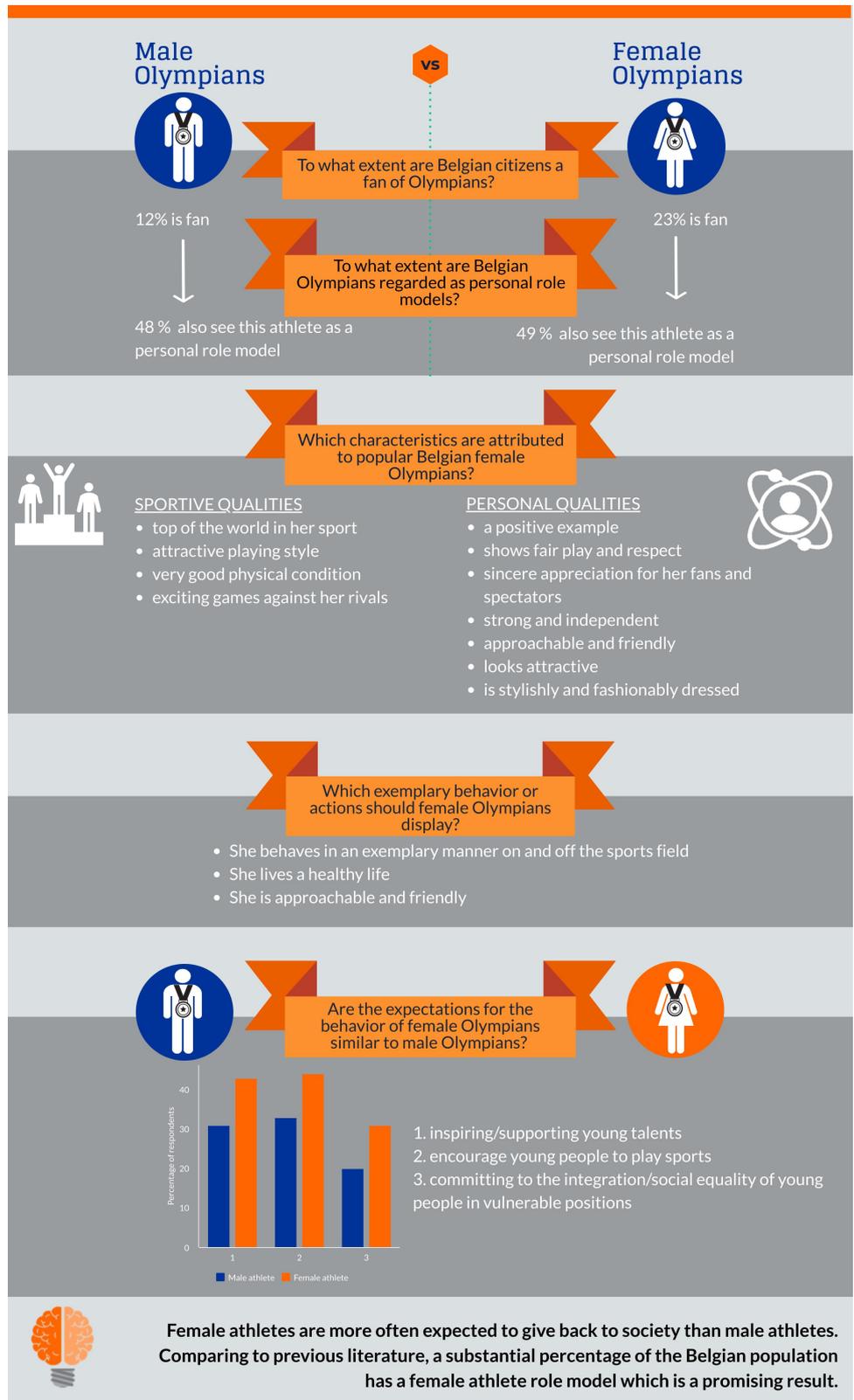
4 research questions

*It is not a disgrace not to reach for the stars, but it is a disgrace not to have stars to reach for. –*

*Benjamin E. Mays*

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Kari Descheemaeker  
Vrije Universiteit Brussel  
Kari.Descheemaeker@vub.be



# The development of an intergenerational movement program for grandchildren and their grandparents using co-creation

Iliano Evelien<sup>1</sup>, Beeckman Melanie<sup>1</sup>, Latomme Julie<sup>1</sup>, Cardon Greet<sup>1</sup>

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

**Introduction:** Many children and older adults do not meet the WHO physical activity (PA) guidelines, despite the physical and mental benefits of sufficient PA levels. In recent years, increased attention has been devoted to intergenerational PA programs because they may have several benefits for children and older adults (e.g., learning skills from each other, improved social well-being, reduction of ageism). An intergenerational PA program focusing on grandchildren and -parents is innovative and may hold potential to promote PA and create better family ties in both children and their grandparents. We aim to develop such a program, using co-creation in order to facilitate future implementation and upscaling.

**Methods:** The theoretical framework Behaviour Change Wheel in combination with a co-creation approach will be used to develop a movement program for grandchildren and -parents. Five co-creation sessions will be organised: two with grandchildren, two with grandparents and one with both together. Eight grandchildren (6-10 years old) and eight grandparents will participate in the co-creation sessions. The barriers and motivators to be physically active together will be identified, activities that are enjoyable and feasible to do together in the sessions and at home will be explored, the needs and requirements for the movement program will be questioned and in the last session, some contents of the preliminary movement program will be tested.

**Results:** Co-development with grandchildren and -parents is expected to result in an attractive and feasible program, because researchers take into account requirements of both age groups. Co-PA is expected to improve PA, psychosocial well-being, motivation to be physically active and family ties in grandchildren and -parents.

**Conclusion:** This intergenerational movement program could help to motivate grandchildren and their grandparents to become more active. In a next step, a pilot study and an RCT to evaluate the movement program will be conducted.

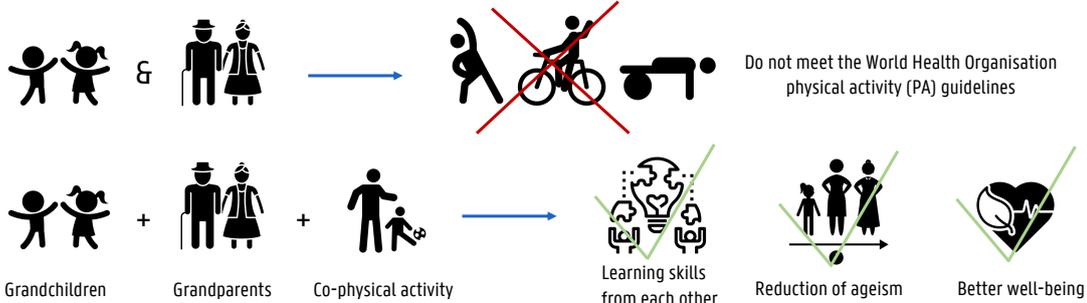
**Correspondence e-mail:** [evelien.iliano@UGent.be](mailto:evelien.iliano@UGent.be)

# THE DEVELOPMENT OF AN INTERGENERATIONAL MOVEMENT PROGRAM FOR GRANDCHILDREN AND THEIR GRANDPARENTS USING CO-CREATION

Iliano Evelien<sup>1</sup>, Beeckman Melanie<sup>1</sup>, Latomme Julie<sup>1</sup>, Cardon Greet<sup>1</sup>

(1) RESEARCH GROUP PHYSICAL ACTIVITY AND HEALTH, GHENT UNIVERSITY, BELGIUM

## Introduction



## Aim

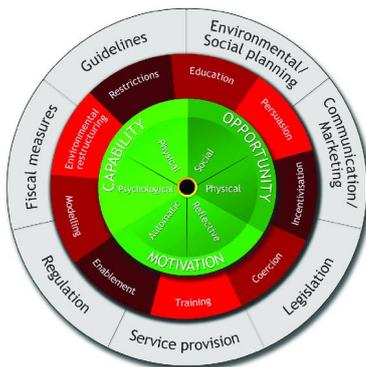
To develop an attractive and feasible intergenerational movement program for grandchildren and their grandparents using co-creation

## Methods

The Behavior Change Wheel as the theoretical framework

Co-creation

- Sources of behaviour
- Intervention functions
- Policy categories



N = 8 grandchildren (6-10 years old)  
N = 8 grandparents (depends on the age of the grandchild)

Co-creation session 1



- ✓ Barriers and motivators to be physically active together
- ✓ Activities that are enjoyable and feasible to do together in the movement sessions and at home

Co-creation session 2



Co-creation session 3



- ✓ Needs and requirements for the movement program
- ✓ Content, format, frequency and duration of the program
- ✓ Intervention goals and intervention functions

Co-creation session 4



Co-creation session 5



- ✓ Testing contents of the movement program
- ✓ Policy categories

## Future work

February – March 2023

Pilot study

- ✓ 6 weeks
- ✓ Testing activities (attractiveness & feasibility), questionnaires and measuring instruments for the RCT

Refinement of the program

September 2023 – June 2024

RCT

- ✓ 9 months: **pre** – **post** (6 months) – **follow-up** (3 months)
- ✓ Measuring the effects of co-PA on family ties and PA
- ✓ *Intervention group*: intergenerational movement program  
*Control group*: no treatment

## Aimed results

Co-development



Co-physical activity



Better family ties



More physically active

Contact

Evelien.Iliano@UGent.be

### References

- WHO guidelines on physical activity and sedentary behavior, November 25, 2020
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# Exploring claims of sport for employability programmes: an assist to the job market?

Commers Tessa<sup>1</sup>, Theeboom Marc<sup>1</sup>, Coalter Fred<sup>1</sup>

(1) VUB

**Introduction:** Rates of young people detached from the labour market and education (NEET) are fairly high in the European Union (12,6%). Correspondingly, there is a growing tendency to see sport as a promising vehicle to tackle this issue by developing soft skills and thereby raising young people's level of employability. However, to date, there is limited research within the specific area of sport for employability (SfE) and limited understanding of effective processes when using sport to achieve developmental outcomes.

**Methods:** In order to gain more insight into these SfE programmes, it might be meaningful to adopt a theory of change approach and investigate how these initiatives construct and deliver their programmes. In line with a theory of change approach, and its focus on understanding the working of a programme, this study aimed to investigate how SfE programmes (1) define their desired outcomes, (2) work towards achieving these outcomes and (3) monitor and evaluate the progress of the participants. Data were gathered by using a single instrumental case study approach within a SfE initiative in Flanders. The selected programme has a long track-record in using sport to develop social skills. Data were gathered through 12 individual semi-structured interviews with 8 staff members.

**Results:** Data highlight that programmes aiming to tackle work readiness may be confronted with a number of challenges regarding programme design, implementation and delivery. Several possible reasons that could induce these challenges, such as for instance the pressure to comply with the requirements of funders, will be discussed.

**Conclusion:** In order to no longer organise SfE programmes merely on the basis of intuition and experience and arrive at a more effective programme, the use of a more theoretically informed and systematic approach is needed.

**Correspondence e-mail:** [tessa.commers@vub.be](mailto:tessa.commers@vub.be)

# Exploring claims of sport for employability programmes

## An assist to the job market?

Tessa Commers<sup>a</sup>, Marc Theeboom<sup>a</sup> & Fred Coalter<sup>a</sup>

a. Faculty of Physical education and Physiotherapy, Vrije Universiteit Brussel

1 out of 8 young people in Europe are neither in employment, education or training (NEET)



### INTRODUCTION

Sport as a promising tool to raise soft skills and employability:

- Employers look for soft skills
- Sport is believed to develop these soft skills

Measuring claims raises two issues:

- Sport for Development (SfD): lack of robust evaluation
- Sport for Employability (SfE): limited research

Adopt a theory of change (ToC) approach and investigate how SfE programmes construct and deliver their programmes



### METHOD

Design:

- Single instrumental case study approach

Selected initiative: SfE programme in Flanders

- NEET
- Sport
- Employability
- Ongoing programme

Data collection:

- 12 semi-structured interviews with 8 programme providers

Data analysis:

- Thematic analysis

### RESULTS

High-level ambitions, but challenges:

- Absence of well-defined definitions and operationalisations of desired outcomes
- Minimal attention follow-up or measurement of participants' outcomes
- Failure to offer a systematic approach

Possible explanations:

- Underestimation importance defining outcomes and strategies
- Lack specific specific knowledge and frameworks
- Adopted strategy not discussed and aligned among partners
- Pressure to comply with the requirements of funders

Recruitment and selection:

"That is **not a deliberate decision**. (...) I find it very difficult to say who I do and do not select and why."



Integration of the programme:

"I was supposed to attend more often but I didn't support those sessions on Mondays. I've taken a step back. **The coach of the youth work organisation is doing his thing there and I'll do my thing on Friday.** Sitting squatted against a tree, starting to hyperventilate, ... I don't see the point."

Sport:

"Here you can work more deeply and personally compared to a regular sport class. But that's still a learning process for me. **I feel I need more background and frameworks** to apply this even more."

### DISCUSSION



Call for the use of theory-based approaches

"Seeks to identify the components, mechanisms, relationships and sequences of cause and effect that are presumed to lead to desired impacts and outcomes". (Coalter, 2013, p. 53)

Benefits:

- Intentionally and commonly promote outcomes → effective
- More insight into why (or why not) changes occur
- Enables ongoing learning

Even the process of constructing is valuable:

- Explicating assumptions: identify possible gaps in the intervention (Weiss, 1995)
- Expects stakeholders to reach consensus (Weiss, 1995)

Only by using a ToC approach, we can intentionally promote specific outcomes and tackle the NEET issue through sports



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Weiss, C.H. (1995). Nothing as practical as good theory: exploring theory-based evaluation for comprehensive community initiatives for children and families. In J. P. Connell, A. C.

Kubisch, L. B. Schorr, & C. H. Weiss (Eds.), *New approaches to evaluating community initiatives: concepts, methods, and contexts* (pp. 65-92). The Aspen Institute.

**DEEL IV**  
**Posterpresentaties**  
**Post-Doc**

# Differences in visual surveillance between beach lifeguards and non-lifeguards: a video-based test

Vansteenkiste Pieter<sup>1</sup>, Lenoir Matthieu<sup>1</sup>, Bourgois Jan<sup>1</sup>

(1) Ghent University, department of movement and sports sciences, Watersportlaan 2 9000 Gent

**Introduction:** Quickly recognising distress and drowning is an essential skill for lifeguards. In a recent *in situ* study, we showed that experienced lifeguards do not look at different locations, but the duration of their fixations is longer and more variable than that of inexperienced lifeguards (Vansteenkiste et al., 2020). The current study investigated to what extent these results can be replicated in a laboratory using video footage.

**Methods:** Twenty-four non-lifeguards and twenty-four certified beach lifeguards watched two 15-minute clips filmed from the perspective of a lifeguard. Neither clips contained any serious incident. Clips were shown on a 15.6" laptop screen equipped with an eye tracker. Participants were instructed to press the spacebar if they would undertake an action (give a warning, blow the horn, or initiate rescue), and call out why they reacted. Average fixation duration and location were analysed using a repeated measures MANOVA. An additional analysis was carried out to analyse only fixations in the 5 seconds prior to reactions.

**Results:** No difference in number of reactions was found between groups. On average, lifeguards looked 'deeper' in the sea than non-lifeguards ( $p=0.001$ ), and had a significantly higher variation in gaze location in the horizontal plane ( $p=0.038$ ), and a significantly lower variation in the vertical plane ( $p=0.008$ ). In contrast to the *in situ* study, no significant differences between non-lifeguards and lifeguards were found for number of fixations or fixation duration. Furthermore, average fixation duration in the 5 seconds prior to a reaction was longer ( $673,95 \pm 398,93\text{ms}$ ) than the overall average fixation duration ( $389,70 \pm 72,89\text{ms}$ ). However, again, no significant difference in fixation duration between lifeguards and non-lifeguards was found.

**Conclusion:** Certified beach lifeguards showed different gaze behaviour than non-lifeguards, but these differences were of a different nature than previously reported in an *in situ* study.

**Correspondence e-mail:** [pieter.vansteenkiste@ugent.be](mailto:pieter.vansteenkiste@ugent.be)

# DIFFERENCES IN VISUAL SURVEILLANCE BETWEEN BEACH LIFEGUARDS AND NON-LIFEGUARDS: A VIDEO-BASED TEST

## Introduction

When distress or drowning is not recognized in time, other actions will come too late for a full recovery of the drowning person. Therefore, **quickly recognising distress and drowning is an essential skill for lifeguards**. Studies have shown that experienced lifeguards spot problems faster and more often than novice lifeguards.

Unfortunately, it is not clear how experienced lifeguards manage to detect aquatic hazards faster than novice lifeguards. Our *in situ* study (Vansteenkiste et al, 2020), we suggested that experienced lifeguards might use longer and more variable fixations than inexperienced lifeguards.

The aim of the current study is to test to what extent these results can be replicated in a lab context using video images.



The aquatic rescue model (StarGuard, 2018)



Experimental set-up

## Methods

### Participants:

24 non-lifeguards and 24 certified beach lifeguards

### Task:

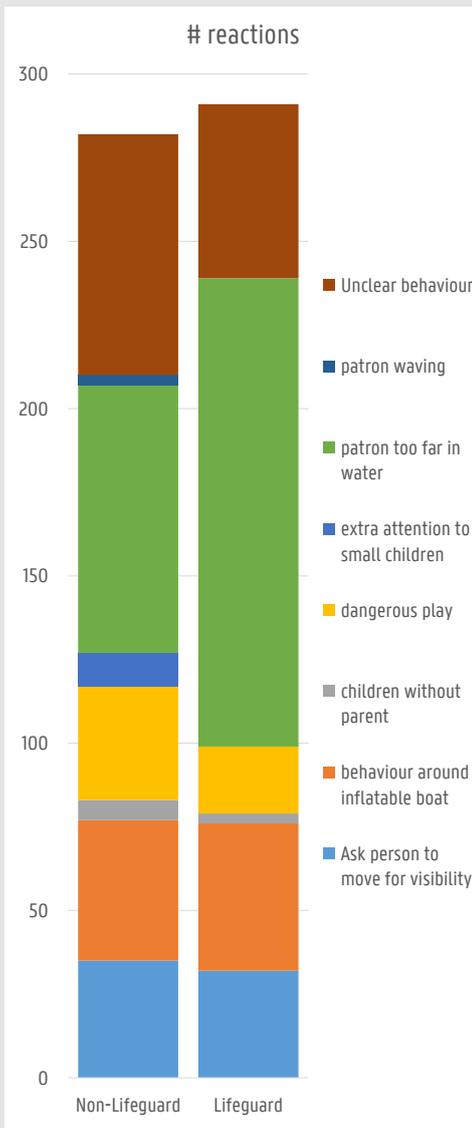
Watch two 15-minute video clips, imagine to be the lifeguard on duty, press the spacebar if they would undertake an action (give a warning, blow the horn, or initiate rescue), and explain why they reacted.

### Equipment:

Clips were shown on a 15.6" laptop screen equipped with a Tobii Pro Fusion eye tracker.

### Analyses:

Reaction time, average fixation duration and location were analysed using a repeated measures MANOVA. An additional analysis was carried out to analyse only fixations in the 5 seconds prior to reactions.

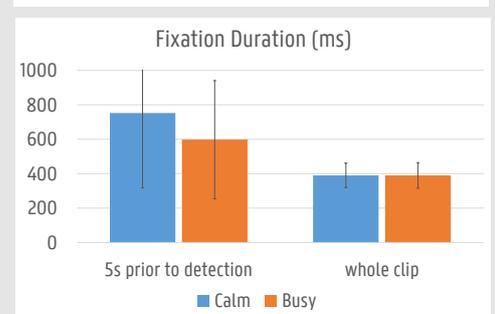
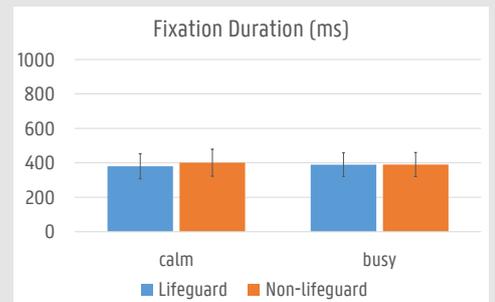


Average fixation location of Lifeguards (red) and non-lifeguards (yellow). Arrows indicate variability in location



## Results & discussion

- No difference in number of reactions
- Lifeguards seem to report more patrons who are swimming too far in the sea
- In line, lifeguards also looked 'deeper' in the sea than non-lifeguards ( $p=0.001$ )
- Lifeguards had a significantly higher variation in gaze location in the horizontal plane ( $p=0.038$ ), and a significantly lower variation in the vertical plane ( $p=0.008$ ).
- No significant differences were found for number of fixations or fixation duration
- Average fixation duration in the 5 seconds prior to a reaction was longer ( $674 \pm 399\text{ms}$ ) than the overall average fixation duration ( $390 \pm 73\text{ms}$ )



## Conclusion

Certified beach lifeguards showed different gaze behaviour than non-lifeguards, but these differences were of a different nature than previously reported in an *in situ* study.

## Contact

Pieter.vansteenkiste@ugent.be

@Pieter\_vsk

For an example of the data output, scan:



## VORIGE EDITIES

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11 december 2020	25 <sup>e</sup> VBSW Symposium	UGent (online)
6 december 2019	Van VK naar Vereniging voor Bewegings- en Sportwetenschappen	KULeuven
14 december 2018	Er zit beweging in mobiliteit	UAntwerpen
15 december 2017	Diversiteit in beweging	VUB
2 december 2016	Take in move out: over voeding en beweging	UGent
11 december 2015	Topsport en wetenschap	KU Leuven
12 december 2014	Transities	UAntwerpen
13 december 2013	Bewegen met vallen en opstaan	KU Leuven
7 december 2012	Van bewegingsonderzoek naar bewegingsbeleid?	VUB
16 december 2011	Bewegen doorheen de jaren	UGent
10 december 2010	Motivatie en transpiratie	UAntwerpen
17 december 2009	Kinesiology in Flanders: Brain drain versus brain gain	KU Leuven
13 november 2008	Technologie in beweging	VUB
30 november 2007	Bewegen in extreme condities	UGent
20 september 2006	Spieren	UAntwerpen
22 september 2005	50 Years of PA, PF and Health in Belgium	KU Leuven
5 november 2004	From Science to Medals	UGent
22 november 2003	Ouderen en bewegen: kinesiologie op leeftijd	VUB
29 november 2002	Locomotie	KU Leuven
30 november 2001	Sport in de begeleiding van jonge topsporters	UGent
6 december 2000	Motorische controle en ontwikkeling, motorisch leren	UAntwerpen
8 december 1999	Fysieke activiteit in de preventieve gezondheidszorg	KU Leuven
10 december 1998	Geslachtsverschillen en kinesiologie	UGent
11 december 1997	Lichamelijke opvoeding: quo vadis?	VUB
12 december 1996	Van Bewegen tot Beweging	UAntwerpen