Vereniging voor Bewegings- en Sportwetenschappen

25e Symposium
11 december 2020
- VBSW Online –

VOORWOORD

Beste collega bewegings-en sportwetenschapper,

Dat 2020 geen gewoon jaar is, moet ik jullie al lang niet meer vertellen. Ook onze jaarlijkse afspraak op het Symposium van de Vereniging voor Bewegings-en Sportwetenschappen, moeten we dit jaar anders (lees: digitaal) laten doorgaan. En laat dit nu net onze jubileumeditie zijn. In plaats van een feesteditie wordt het dus een afgeslankte versie van achter ons scherm.

Het symposium is de gelegenheid bij uitstek voor jonge onderzoekers om hun werk voor te stellen aan collega's, maar vooral ook het moment om de bewegings-en sportwetenschappers van de Vlaamse universiteiten samen te brengen. Het is voor velen onder ons het enige moment waarop we de tijd kunnen nemen om elkaar te ontmoeten en onderzoekservaringen uit te wisselen. Zeker in het huidige tijden zou het zinvol geweest zijn om van elkaar te horen met welke problemen we geconfronteerd worden door de veiligheidsmaatregelen die genomen worden, hoe we ons onderzoeksopzet hebben moeten veranderen, of hoe we in de problemen komen om een studie te kunnen finaliseren.

Ondanks de vele uren schermtijd doet het ons toch plezier om jullie in dergelijke grote getale aanwezig zien op deze digitale versie van ons symposium. We hebben ervoor gekozen om vooral de jonge onderzoekers aan het woord te laten deze ochtend. De Gaston Beunen prijs laten we doorgang vinden en we hebben vandaag 11 PhD studenten die hun werk zullen voorstellen. Dat er topics tussen zitten uit de verschillende onderzoeksgebieden binnen de bewegings-en sportwetenschappen, gaande van sportmanagement over motorisch leren tot sportfysiologie, toont aan dat we onze doelstelling om een interdisciplinair forum te zijn voor alle wetenschappers binnen dit vakgebied ten volle bereiken.

Deze 25^{e} editie zal dan misschien niet de feesteditie zijn die we voor ogen hadden, toch willen we dit niet zomaar voorbij laten gaan. Prof. Dr. Romain Meeusen, medeoprichter en erevoorzitter van de Vereniging, zal ons op het einde van deze voormiddag een kort overzicht geven van de geschiedenis van de Vereniging doorheen de voorbije 25 jaar. Het verheugt ons dat Romain, ondanks zijn drukke agenda als vice-rector aan de VUB, de Vereniging toch nog een warm hart toedraagt en hiervoor tijd wilde vrijmaken. En wat dat feestje betreft: dat sparen we dan wel tot volgend jaar als we elkaar terug in levende lijve kunnen ontmoeten.

Jan Boone

Voorzitter Vereniging voor Bewegings- en Sportwetenschappen

PROGRAMMA 25e SYMPOSIUM

08.30 – 08.40 Introductie

08.40 – 09.55 Mondelinge presentaties I

08.40	Eline Coppens	Identifying profiles based on AMC, PMC and OSP
08.55	Gil Bourgois	High-intensity interval test in the heat
09.10	Sofie Smismans	Athletes and the job market: a winning team?
09.25	Kobe Houtmeyers	Training load in football: youth vs. first team
09.40	Nele Van Doren	Relation between motivating style and activity
09.55	Silke De Waelle	Decision making development in young athletes

10.10 – 10.20 Pauze

10.20 – 10.50 Parallelle postersessies

	Sessie A	Sessie B
10.20	Phaedra Debekker	Linde-Raven Depuydt
10.30	Katarina Huyghe	Joachim D'Hondt
10.40	Melanie Beeckman	Aline Van Roey

10.50 – 10.55 Pauze

10.55 – 12.10 Mondelinge presentaties II

10.55	Julie Latomme	The Run Daddy Run intervention
11.10	Thibaux Van der Stede	Training adaptations and the histamine system
11.25	Anke Govaerts	Cartilage: move to load or overload?
11.40	Griet Warlop	Hazard perception in DCD during cycling
11.55	Margot Ricour	Exploring quality of organized youth sports

12.10 – 12.20 Afsluiten met prof. Romain Meeusen

12.20 – 12.30 Prijsuitreiking

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DEEL I

Mondelinge presentaties

Gaston Beunenprijs

Actual motor competence, perceived motor competence and organized sports participation in 8-to 12 year-old Belgian children.

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Introduction: Actual motor competence (AMC) is considered an important prerequisite of organized sports participation (OSP). Special attention should be paid to children displaying low levels of AMC and perceived motor competence (PMC) as this combination is found to be disadvantageous in terms of OSP. Therefore, the aim of this study was to establish profiles in children based on AMC, PMC and OSP, while using aligned motor competence measurement instruments.

Methods: The AMC of all participating children (N = 206; 112 boys; M_{age} = 10.83 ± 0.92 years) was measured with the Körperkoördinationstest für Kinder. An adapted version of the Physical Self-Confidence Scale was used to assess their PMC. OSP was measured using sections of the Flemish Physical Activity Questionnaire. Cluster analyses were applied to analyze the collected data.

Results: Cluster analyses identified six different profiles based on AMC, PMC and OSP: three profiles were characterized by corresponding levels of AMC, PMC and OSP (i.e., low-low-low, average-average-average, high-high-high) and three profiles were characterized by divergent levels of AMC, PMC and OSP (i.e., low-low-high, average-low-low, high-high-average). Combined Pearson correlations between AMC and PMC revealed that five out of these six profiles (86,4%, n = 172) showed moderate associations between both variables (i.e., $r=0.555$, $p<0.01$ in the aligned clusters, and $r=0.579$, $p<0.01$ in the less-aligned clusters). In addition, a high Pearson correlation was found between AMC and OSP in the aligned clusters ($r=0.750$, $p<0.01$).

Conclusion: Children's perception of their motor competence might be estimated more accurately because they seem to use product-oriented feedback to provide additional relevant information about their perceived skill, and therefore presented a stronger correlation between the product-oriented AMC and PMC in the current study. PE teachers should take into account that children seem to attach greater importance to product-oriented self-assessment in terms of motor skill.

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The effect of acute heat exposure on exercise capacity and recovery during a high-intensity interval test

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Introduction: Exercise is often impaired in the heat. The purpose of this study was to investigate to what extent acute heat exposure would have detrimental effects on exercise capacity and recovery during high-intensity interval exercise to exhaustion and how core and skin temperature are related.

Methods: Twelve physically active women (26.4 ± 3.6 year; 40.9 ± 5.1 $ml.min^{-1}.kg^{-1}$) volunteered to take part in this study. An interval exercise test was performed in both 18 and 36°C, in which the participants had to cycle three times to exhaustion. The power output of the work bouts (WB) to exhaustion was determined equal to the individual theoretical time to exhaustion in 4 min, based on the critical power concept. The active recovery in between consisted of the power output at 90% of individual gas exchange threshold.

Results: Time to exhaustion of WB1, WB2 and WB3 differed ($p \leq 0.005$) between 18 and 36°C, respectively 226 ± 32 vs. 190 ± 27 s; 166 ± 26 vs. 120 ± 19 s and 138 ± 26 vs. 92 ± 18 s. Percentual recovery before WB2 (74 ± 12 vs. 64 ± 10 %) and WB3 (62 ± 12 vs. 49 ± 11 %) was also lower ($p = 0.001$) in 36°C compared to 18°C. Core temperature was only significantly higher in 36°C after WB3 and then onwards, reaching a peak of 39.13 ± 0.38 vs. 38.58 ± 0.31 °C. Meanwhile, skin temperature was at all levels higher in the heat compared to moderate conditions; 35.54 ± 0.13 vs. 27.66 ± 0.19 °C.

Conclusion: Exercise capacity and recovery during interval exercise were diminished with acute heat exposure. The rise in core temperature per se is not the main factor eliciting the negative effect. More likely, skin temperature and the temperature gradient, together with other physiological parameters, play an important role.

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Elite athletes on the job market: A competitive advantage?

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Introduction: Elite athletes typically retire from sport at a relatively young age which implies that, after their sporting career, most engage in a new professional career. When entering the job market, many athletes rely on the potential transfer of competencies developed throughout their athletic career (e.g., leadership). This study aimed at identifying (1) the competencies athletes perceive as giving them a competitive advantage on the job market, and (2) the matches and mismatches between athletes' and employers' perceptions on this potential competitive advantage.

Methods: A mixed-methods approach was adopted, combining the Athletes Competency Questionnaire for Employability (ACQE) and focus groups and interviews. In total, 954 elite athletes (54% active, 46% former) completed the ACQE, consisting of 28 items structured within four higher-order competencies (i.e., Career & Lifestyle Management, Career Communication, Career Resilience, Career Engagement & Flexibility). Participants selected five items they felt (would) give them the biggest competitive advantage on the job market. Second, five focus groups and six semi-structured interviews with 58 employers were conducted on the topic of athletes' employability. Qualitative data were analysed inductively using thematic data analysis.

Results: Athletes report that they gain a competitive advantage from 'Career Resilience' and 'Career & Lifestyle Management'. Employers largely support the athletes' perceptions and confirmed that athletes' strongest competencies can be an added value for their company. A mismatch between athletes' and employers' perceptions was identified for 'Career Communication'. While employers view athletes as strong communicators and networkers, athletes indicated that building a professional network is their greatest weakness.

Conclusion: This is the first study to identify and compare athletes' and employers' perceptions regarding employability. Findings highlight that, in addition to developing facilitating structures, employers and career support providers should focus on assisting athletes in developing competencies to maximize their chances on the job market.

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External load differences between elite youth and professional football players: ready for take-off?

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Introduction: A progressive increase in training load is advised to develop the physical capacities of youth players. However, when elite youth players transition to the first team, a sudden increase in training load can be expected. Previous studies compared the external load between different age categories but no study compared the external load between elite youth and first team players. Therefore, this study aims to examine differences in external load between the U19 team (U19) and the first team (FT) within a professional football club.

Methods: This study included external load data of 11 FT (25.1 ± 2.8 years) and 9 U19 players (17.6 ± 0.6 years), collected during the 2016-2017 season. Because FT often played a mid-week match, the load of U19 was compared against two weekly scenarios, with (FT-M1) or without a mid-week match (FT-M0). A global positioning system (U19: Catapult X4; FT: Catapult S5) was used to collect the data. Variables were total distance (TD) and TD covered at 12-15, 15-20, 20-25 and >25 $km.h^{-1}$. These variables were analysed as weekly external load (m), external intensity ($m.min^{-1}$) and external load monotony (a.u.). Differences between U19 and FT were examined using general linear models and standardised using Cohen's d principle.

Results: TD-based weekly external load was higher for U19 compared to FT. Differences at higher velocities were, however, substantially less, with TD > 25 $km.h^{-1}$ being lower for U19. Weekly external intensity was lower for U19 compared to FT. Weekly external load monotony was higher for U19 compared to FT-M1. Compared to FT-M0, load monotony was higher for TD at 12-15 and 15-20 $km.h^{-1}$, while it was lower for TD and TD covered > 25 $km.h^{-1}$.

Conclusion: To optimise the physical development of elite youth players, a gradual progression in weekly external intensity and variation is advised.

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Motivating young people to adopt an active lifestyle: relation between physical education teachers' motivating style, students' motivation and their physical activity

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Introduction: Grounded in self-determination theory, this study sought to analyze how students' perceptions of physical education teachers motivating style relates to students' physical activity levels during and outside class. While most prior research examining these relations made use of self-reports only, this study adds to this literature by using device-based measures of students' activity levels. The study also examined the indirect effect of students' motivation (autonomous motivation, controlled motivation and amotivation) in this relation.

Methods: The study sample consisted of 412 secondary school students, aged between 11 and 15 (M = 13.07, SD = 1.02). Students completed a multi-section questionnaire assessing perceptions of teachers' motivating style and students' motivation toward physical education. Students' physical activity levels during and outside class were measured by means of accelerometers (ActiGraph GT3X) that were worn for 7 consecutive days. Structural equation modelling was used to examine the hypothesized relations among the study variables.

Results: Perceived teachers' need-supportive motivating style displayed a significant positive relation with students' physical activity levels during and outside class, with an indirect effect of students' autonomous motivation in this relation. Controlled motivation ($p = 0.46$; $p = 0.25$) and amotivation ($p = 0.50$; $p = 0.46$) were not associated with students' physical activity levels during and outside class.

Conclusion: This study contributes to the literature by linking students' perceptions of teachers' motivating style to their physical activity levels assessed by means of accelerometers. The findings reveal that students value and enjoy the physical education lesson more if their teachers adopt a more motivating style, which in turn leads them to be more physically activity during and outside the lesson.

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Visual cognition and experience mediate the relation between age and decision making in youth volleyball players

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Introduction: The ability to accurately select the next best move is crucial in fast ball sports such as volleyball, as it directly influences game outcomes. In this regard, experts consistently show superior decision making skills compared to novices, but little is known about its development in youth players, and even less is known about the factors that influence this development. Therefore, this study aimed to investigate the mediating effects of visual cognition and volleyball experience on the relationship between age and decision making in youth volleyball players.

Methods: 171 Female volleyball players aged 6-17 years old performed a sport-specific, video-based test of decision making, as well as 4 different visual cognition tests. Using structural equation modeling, we examined if volleyball experience and a latent variable constructed from the four tests of visual cognition act as parallel mediators in the association between age and decision making.

Results: The parallel multiple mediation model for the association between age and decision making was supported in youth volleyball players. Moreover, significant indirect effects and a non-significant direct effect indicated that visual cognition and experience fully mediated the relation between age and decision making, and together explain 38% of the variance in decision making performance. The effects of both mediators were not significantly different and there was no residual correlation between experience and visual cognition, which indicates that these mediators are unrelated to each other.

Conclusion: Our findings demonstrate that visual cognition and volleyball experience mediate the relation between age and decision making independently, which indicates that they each influence different parts of the decision making process. These results highlight the importance of the development of perceptual-cognitive skill in young players and future research should further investigate the development of these skills as well as their underlying factors in different kinds of sports.

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Implementing and evaluating an intervention for fathers and their children: the Run Daddy Run intervention and its effect on (co)physical activity and other health-related behaviours

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Introduction: Fathers play a unique and important role in shaping their children's physical activity (PA) levels, independent from the mother. Lifestyle interventions focusing simultaneously on PA of fathers and their children ("co-PA") are therefore a novel and promising way to improve PA of both. A theory-based lifestyle intervention to improve co-PA in fathers and children was therefore co-created with fathers. This study aims to investigate the effects of this "Run Daddy Run" intervention on (co-)PA, its determinants and parental practices.

Methods: The Behavior Change Wheel was used as a theoretical framework to systematically develop the intervention, combined with a co-creation approach. The intervention consisted of 6 (inter)active father-child sessions and an eHealth component, delivered over a 14-week intervention period. A total of 102 fathers and one of their primary school-aged children (6-8 years old) participated (control group/CG (n=63); intervention group/IG (n=39)). Due to COVID-19, only 2/6 sessions could be implemented as planned, the remaining part was replaced by online initiatives and activities. Pre-test measurements were conducted between November '19-January '20, post-test measurements in June '20. Outcomes were measured using accelerometry and an online questionnaire. To evaluate the intervention, multilevel analyses were conducted.

Results: Positive intervention effects were found. The IG showed a significantly larger increase in total co-PA compared to the CG. This effect was found for weekdays and weekend days, and for co-PA performed 1 on 1 and with multiple family members. Positive intervention effects were also found for some parental practices and fathers' self-efficacy in motivating the child towards PA.

Conclusion: The Run Daddy Run intervention was effective in improving co-PA of fathers and their children and other health-related behaviours. This has important implications for future research and health policy, where targeting fathers is a novel and effective approach to improve health and health behaviours in children.

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The histamine system regulates the integrative adaptations to exercise training

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Introduction: Exercise training is a powerful strategy to prevent and combat chronic diseases. These therapeutic effects, called exercise-is-medicine, are regulated by a complex interaction between various signalling events within the human body. The molecule histamine, functioning via specific histamine receptors, has emerged as a potential important transducer of the acute exercise response. The aim of the current study was to unravel if the histamine system mediates the chronic adaptations to an exercise training program.

Methods: We conducted a randomised, placebo-controlled and double-blind study, employing a powerful pharmaceutical strategy to block histamine receptors during each training session. Male participants were allocated to a placebo (n=9) or histamine blockade (n=9) group and performed 6 weeks of supervised aerobic interval cycling training. Before and after the training program, aerobic performance (incremental cycling test), whole-body insulin sensitivity (Oral Glucose Tolerance Test) and vascular function (Passive Leg Movement) were determined, accompanied by muscle biopsies to assess mechanistic outcomes. Training-induced changes between groups were compared with linear mixed models.

Results: Aerobic performance, as reflected by maximal power output (+12% vs +7%, $p=0.044$) and submaximal respiratory compensation point (+19% vs +6%, $p<0.001$), increased substantially more in the placebo compared to the histamine blockade group. Improvements in whole-body insulin sensitivity (+26% vs +1%, $p=0.010$) and vascular function (+37% vs -14%, $p=0.017$) were completely abolished in the histamine blockade group. These functional data were paralleled by impaired adaptations in mitochondrial capacity (citrate synthase activity), muscle capillarisation and endothelial nitric oxide bioavailibity (eNOS protein content) in the muscles of the histamine blockade group.

Conclusion: Histamine signalling during and after exercise is essential for key adaptations to exercise training related to aerobic performance, whole-body insulin sensitivity and vascular function. These data emphasize the importance of the histamine system for the therapeutic exercise-induced effects for cardiovascular and metabolic diseases.

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Shear loading reduces the anabolic effect of compressional loading on cartilage

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Introduction: Osteoarthritis (OA) is the most common chronic joint disease, characterized by cartilage degeneration. The initiation of OA is associated with altered mechanical factors. Excessive loading, trauma, malalignment or joint instability are known to change cartilage loading, disrupting tissue homeostasis and leading to cartilage damage. More specifically, alterations in the 3D loading profile, and in particular increased shear forces, are suggested to initiate catabolic molecular responses causing cartilage thinning and degeneration. However, *in vitro* data confirming this is currently lacking. We aim to investigate how increased shear loading affects the metabolism of human osteoarthritic cartilage.

Methods: Human osteoarthritic articular chondrocytes (hOACs) were encapsulated in alginate disks and mechanically loaded in the TA ElectroForce® BioDynamic Bioreactor according to following loading conditions: (a) 10% compression at 1Hz for 1h and (b) 10% compression and 10° shear loading at 1Hz for 1h. Unloaded constructs were used as control. After loading, hydrogels were dissolved and gene expression levels of hOACs for specific for anabolic pathways (Col2a1, Aggrecan and Perlecan), catabolic processes (MMP-3 and MMP-13) and chondrogenic transcription factor (Sox9) were evaluated using RT-qPCR. Same experiments were repeated in a murine chondrogenic precursor cell line (ATDC5), considered as a healthy control group.

Results: The bioreactor was successfully set-up to mimic cartilage loading. In ATDC5 cells, compression elicits an increase in all measured ECM genes (Col2a1, Aggrecan and Perlecan) compared to unloaded controls, suggesting an anabolic response. This upregulation was decreased when adding additional shear strain. The anabolic response of Aggrecan and Perlecan to compressive loading was lower in osteoarthritic chondrocytes, and Col2a1 expression appeared decreased. Adding shear strain reversed this effect on collagen expression. Multi-directional loading increased transcription factor Sox9 expression compared to compression in both ATDC5 and OA chondrocytes. In OA chondrocytes, both loading regimens increased MMP-3 and MMP13 expression.

Conclusion: Shear loading reduces the anabolic effect of compressive loading in both cell types. OA cells presented more catabolic response to mechanical loading compared to precursors, given the increase in catabolic enzymes MMP-3 and MMP-13. In future work, healthy human primary cells will be used as an additional group. Furthermore, varying magnitudes of compression and shear loading will be imposed to better correspond to the in vivo physiological and pathological loading.

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Hazard perception in cycling in young adults with developmental coordination disorder

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Introduction: Cycling is extremely challenging for individuals with DCD, not just because of the complexity of the motor skill, but also because it requires continuous adjustments of one's speed and trajectory to other traffic users or hazards. Earlier research indicated that visuospatial processing and oculomotor control, which are essential for scanning and judging the environment, are affected in DCD. To this end, the present study explored hazard perception and the associated gaze behaviour during a virtual cycling task in young adults with DCD and their typically developing counterparts.

Methods: Nine adults with DCD (age: 23.56 ± 3.68) and nine typically developing (TD) individuals (age: 24.67 ± 3.74) completed a hazard perception test, which consisted of fourteen video clips filmed from the perspective of a cyclist in traffic. Participants were asked to imagine that they were cycling and to click the computer mouse when a hazardous situation requiring a brake or steering action, occurred. After each fragment, the participant indicated the severity of the hazard on a scale from 0 to 5. Eye movements were tracked using a remote eye tracking device.

Results: The traffic situations were assessed as more dangerous by the DCD group compared to the TD individuals. Individuals with DCD fixated the hazard later after its appearance (972.08 ± 828.52 ms) compared to TD individuals (322.35 ± 371.28 ms). However, the groups were equally fast to click the mouse after a hazard occurred. Individuals with DCD made fewer fixations on the hazards (DCD: 3.26 ± 1.24; TD: 4.54 ± 0.42) and spent less time fixating them in total (DCD: 1354.20 ± 554.84 ms; TD: 2028 ± 500.63 ms).

Conclusion: Hazard perception in DCD differs from that in typically developing individuals, which indicates that the difficulties in cycling in DCD cannot solely be attributed to motor impairments.

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Quality of youth sports from the perception of Flemish national governing bodies

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Introduction: In literature, the positive effects of sport participation have been extensively investigated. Together with the fact that sport-based programs are the most popular organized activities among youngsters, and that sports clubs are the core of the sporting system in many European countries, the organized sport sector has an imperative role to fulfil. On the other hand, alarming trends have been observed concerning the physical activity levels for youth and the high dropout rates from organized sport. High quality youth sport programs should offer a solution to these problems. However, quality is often referred to without exactly defining what quality of youth sport means. Furthermore, little literature examines the activities that instances such as national governing bodies (NGBs) have already initiated to increase quality of youth sports. The purpose of this study is to identify the key determinants of youth sport quality from the perception of NGBs.

Methods: Flanders, the Northern part of Belgium, is used as a case study to investigate this. First, a framework of the determinants of the quality of youth sport is established from the literature. Second, an overview is established showing what NGBs currently undertake to increase quality and quantity of youth sport working in their affiliated sporting clubs (document analysis) and what their perceptions are regarding these initiatives (survey and focus groups).

Results: The framework results in two types of quality: organizational/strategic quality and operational quality. The initiatives that Flemish NGBs undertake to increase quality and quantity of their youth sport working are classified in eight themes.

Conclusion: Based on the document analysis, the results show that most activities are undertaken to increase youth sport participation but that little is done to increase the quality of youth sport. Also, Flemish NGBs are in an organizational mindset and need more support and guidance to implement operational quality dimensions.

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DEEL II

Posterpresentaties

Prioritising determinants of eating behaviour during the transition to parenthood using the "DONE" framework

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Introduction: Individual, interpersonal and environmental determinants of changes in eating behaviour throughout pregnancy and postpartum have been described. Insight in the importance of these determinants is needed to develop achievable interventions. In this mixed-method study, we aimed to investigate to what extent each determinant affected first-time parents' eating behaviour, and if this was different for women versus men. A second aim was to involve experts in prioritising the determinants.

Methods: A list of 54 determinants was rated by first-time parents on a scale of 1 (no impact) to 10 (very high impact). Descriptive statistics were used to determine the importance and independent samples t-tests to examine sex differences. Experts rated the determinants on three levels, namely modifiability, relationship strength and population level effect, after which a 'priority for research'-score was generated.

Results: According to first-time parents, changes in eating behaviour during pregnancy were mainly influenced by determinants on the biological and psychological level, where in the postpartum period determinants on the biological, psychological, situational and interpersonal level were important. All determinants, both during pregnancy and postpartum, were scored significantly higher by women than by men. According to the experts, during pregnancy, the psychological determinants scored high in terms of modifiability, relationship strength and population level effect. Postpartum environmental, interpersonal and psychological scored high for modifiability, relationship strength and population level effect.

Conclusion: Most of the determinants that were considered as important by women and men, also received high scores by the experts. A list of priority of determinants of changes in eating behaviour of expecting and first-time parents was made. Incorporating psychological determinants when developing intervention strategies during pregnancy and environmental, interpersonal and psychological determinants postpartum should be the main focus.

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Evaluation of determinants of eating behaviour during the transition to parenthood using the "DONE" framework

Debekker Phaedra, Versele Vickà, Stok Marijn, Devlieger Roland, Bogaerts Annick, Clarys Peter, Deliens Tom, Deforche Benedicte and Aerenhouts Dirk.

Introduction

- The transition to parenthood is a crucial period in life of women and men in which changes in energy balance related behaviour (EBRB) occur[1].
- Improving nutritional behaviour and maintaining/initiating healthy dietary habits are important to control weight related outcomes[1].
- The Determinants Of Nutrition and Eating (DONE) framework is an example of an interdisciplinary framework[2].

→ **The aim of this study was:**

(1) To determine the self-indicated importance of determinants of first-time parents during pregnancy and within one year postpartum according to sex.

(2) To involve experts in prioritising the determinants.

Methods

Step 1 Focus group discussions were used to collect data about changes in eating behaviour during pregnancy and within one year postpartum.

Step 2 Based on focus group data, a list of 54 determinants (33 during pregnancy + 21 postpartum) of changes in eating behaviour was developed.

During pregnancy	Determinants	Postpartum
33	Determinants	21
25	Individual (sublevels: biological, psychological and situational)	13
5	Interpersonal	7
3	Environmental (sublevels: meso/macro, micro)	1

The list was rated by:

Study sample of 179 first-time parents (105 women/74 men)

During Postpartum

Scoring:
- 0 (no impact) ---------- 10 (very high impact)

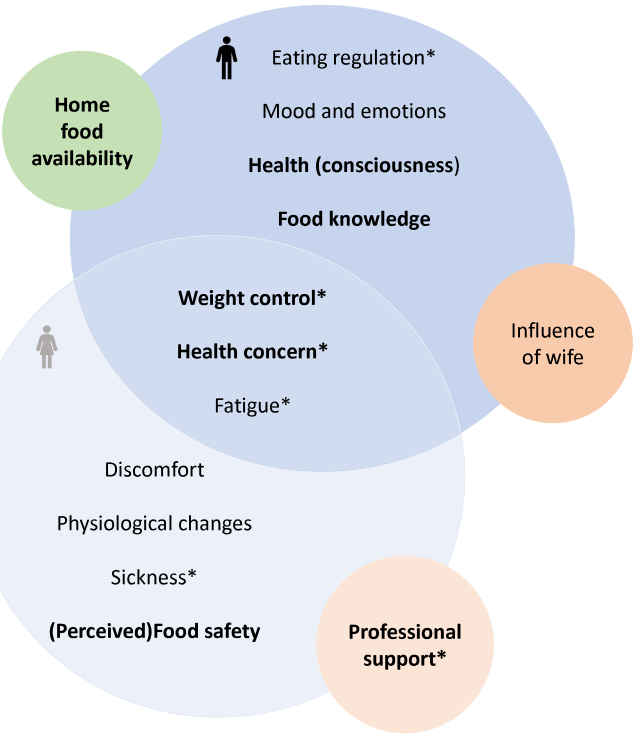
28 academic experts in the field

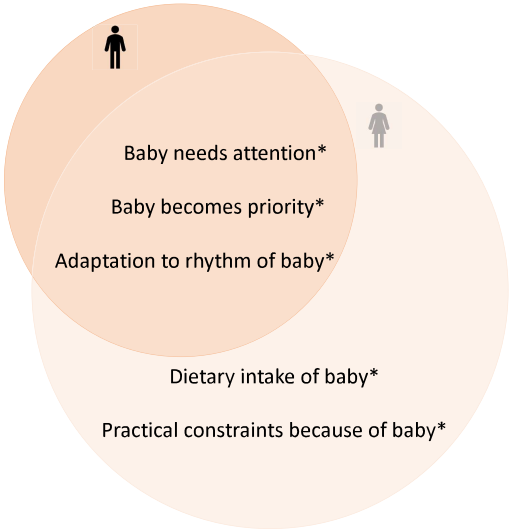
During pregnancy and Postpartum

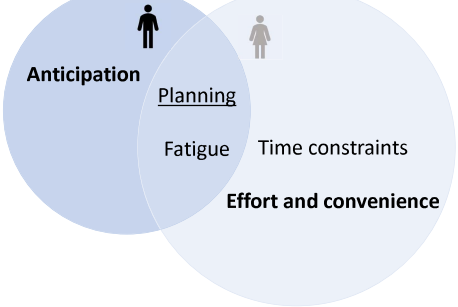
Scoring:
- Modifiability: low, medium, high
- Relationship-strength: correlational, causal
- Population-level effect: low, medium, high

Results

- Based on highest mean scores.
- **Bold**: High research priority score (>2) rated by experts, underlined= only high research priority score for women.
- * =significant difference between women and men ($p<0.05$) derived from an independent sample t-test.







Conclusion

- A list of priority of determinants of changes in eating behaviour, during pregnancy and postpartum, of expecting and first-time parents was made.
- Researchers and pregnancy professionals can use this information to develop achievable interventions to help both expecting and first-time parents optimize their nutrition intake during pregnancy and in the postpartum period.

Important levels and sublevels of changes in eating behaviour	*According to first–time parents*	*According to experts*
During pregnancy	Biological Psychological	Psychological
Postpartum	Individual Interpersonal	Psychological Interpersonal Environmental

For more information please contact: phaedra.debekker@vub.be

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VRIJE UNIVERSITEIT BRUSSEL
KU LEUVEN
Research Foundation Flanders
Opening new horizons

Identification of biofeedback candidates for musculoskeletal loading in running

Depuydt Linde-Raven[1], Fiers Pieter[1], and Segers Veerle[1]

(1) Department of Movement and Sport Sciences, Ghent University, Ghent, BELGIUM

Introduction: Despite the numerous beneficial effects of running, overuse injuries are very common. Injuries result from experiencing load which is beyond loadbearing capacity. To date, the load on internal biological structures (e.g. tibial load) is determined by using detailed musculoskeletal models. This approach results in accurate quantification of the load but requires many inputs making its use impractical. As such, most studies aiming to reduce load rely on more direct measures such as kinetics and kinematics. However, for most of these, their relation with internal load is still unsecure which might explain their limited success in reducing load. The main purpose of this study is to identify which easy-to-measure variable(s) correlate strongly with tibial compression force over a range of speeds and body masses. A second aim is to investigate whether the selected variables are able to predict tibial compression force.

Methods: Ten healthy recreational runners will perform 16 running trials where speed and body mass will be adjusted. For each trial, ground reaction forces and kinematics will be collected enabling calculation of six easy-to-measure variables (vertical instantaneous loading rate, resultant loading rate, active peak, peak braking force, vertical excursion and peak knee flexion angle) and two tibial bone load metrics (peak force and impulse).

Results: Due to the specific circumstances related to the COVID-19 crisis, there is no data available yet.

Conclusion: Because of the unavailability of the data it is not possible to formulate a conclusion at this moment. Based on the literature, the vertical instantaneous loading rate and active peak are expected to have the strongest correlations with internal loading metrics, but even these variables will only moderately predict internal loading.

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IDENTIFICATION OF BIOFEEDBACK CANDIDATES FOR MUSCULOSKELETAL LOADING IN RUNNING

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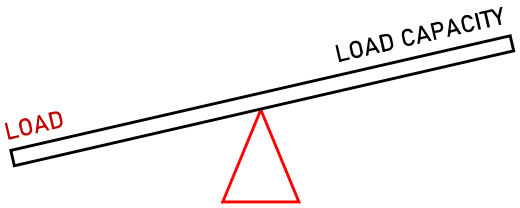
RESEARCH UNIT BIOMECHANICS AND MOTOR CONTROL OF HUMAN MOVEMENT

INTRODUCTION



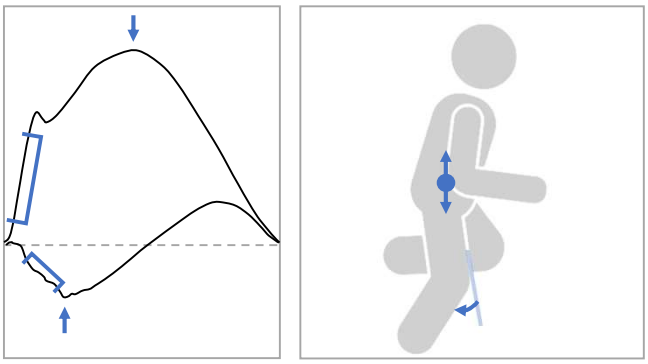
RUNNING INJURIES

LOAD = (INTERNAL LOADING)$^{7-9}$ X AMOUNT OF CYCLES

(NET) JOINT MOMENTS
(NET) JOINT REACTION FORCES
TIBIAL BONE LOAD

DIFFICULT TO MEASURE

KINETICS — KINEMATICS



EASY-TO-MEASURE VARIABLES

AIMS

1. Identify which "easy-to-measure" parameter(s) correlate strongly with musculoskeletal loading and more specifically tibial compression force.
2. Investigate whether the selected variables are able to predict tibial compression force.

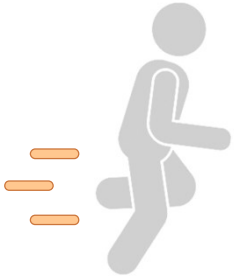
METHODS

STUDY POPULATION:

- 10 female subjects | 33-55 years old
- Pace: 3-5km / 30min | Able to run continuously for 30 min

DESIGN:

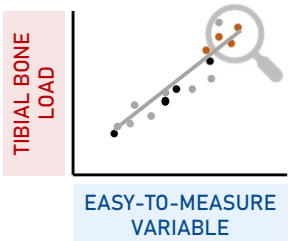
16 OVERGROUND RUNNING TRAILS



AT DIFFERENT SPEEDS RANGING FROM 1.8 – 3.0 m.s^{-1}

WITH ADDED MASS RANGING FROM 3-7% OF TOTAL BODY WEIGHT

EXPECTED RESULTS:



SPEED + BODY MASS + ACTIVE PEAK + VILR
→ TIBIAL BONE LOAD

GHENT UNIVERSITY

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Remodelling consumers' diets by means of the covenant balanced diet and Nutri-Score Front-of-Package label: assessing the impact on diet quality of the Belgian population

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Introduction: Governments commit themselves to guide consumers towards healthier food choices. The association of the Belgian food industry created nutritional regulations in the Covenant Balanced Diet of 2012–2017. The Belgian Minister of Health introduced the Nutri-Score as a Front-Of-Pack label in 2018. This study investigated the impact of remodelling consumers' diets towards different food recommendations in the Belgian population.

Methods: Three replacement scenarios were conducted on data of the Belgian Food Consumption Survey 2014 (n=3146) distributed over 3 age groups, namely(1) 3-9 years, (2) 10-17 years, (3) 18-64 years. In scenario 1, recommendations of the Covenant regarding breakfast cereals, chocolates, biscuits, dairy products, soft drinks, soy- and plant-based drinks were applied, investigating the influence on total daily energy intake and macronutrient distribution. In scenario 2, nutritional values of breakfast cereals, biscuits and dairy were replaced by the nutritional values of the best possible Nutri-Score within each food (sub)category to estimate the influence on energy intake and nutrient density. In scenario 3, the simulations of scenario 1 and 2 were combined to estimate the influence on total energy intake and nutrient density. Paired samples t-tests were used to compare the values within each scenario, for each age group.

Results: Statistical significances were found in all scenarios and age groups. Most improvements were found in age group 3, where in scenario 2 sodium (-5.46%) obtained the largest change and total daily energy (-7.72%) and fat (-9.06%) in scenario 3. For age group 2, scenario 2 and 3 led to a reduction in fat intake of respectively -5.00% and -9.99%.

Conclusion: Although improvements were small, these findings suggest that food recommendations such as the Covenant and nutrition labels, such as Nutri-Score, can actually contribute to an improved diet quality among people of all ages.

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REMODELLING CONSUMERS' DIETS BY MEANS OF THE COVENANT BALANCED DIET AND NUTRI-SCORE FRONT-OF-PACKAGE LABEL: ASSESSING THE IMPACT ON DIET QUALITY OF THE BELGIAN POPULATION

Katarina Huyghe[1], Marie Vermote[1, 2, 3], Peter Clarys[1], Stefanie Vandevijvere[4]

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INTRODUCTION

Governments commit themselves to guide consumers towards healthier food choices.

Covenant Balanced Diet of 2012–2017 (CBD 2012-2017):
The association of COMEOS, FEVIA and the FOD Belgian Health created nutritional regulations in, fighting overweight, obesity and unbalanced diets and lifestyle [1],

Nutri-Score:
First introduced in 2018 by the Belgian Minister of Health as a voluntary Front-Of-Pack label [2].

AIM: This study investigated the impact of remodelling consumers' diets towards different food recommendations in the Belgian population.

METHODS

Three replacement scenarios were conducted on data of the Belgian Food Consumption Survey 2014 (n=3146) distributed over 3 age groups, namely (1) 3-9 years, (2) 10-17 years, (3) 18-64 years.

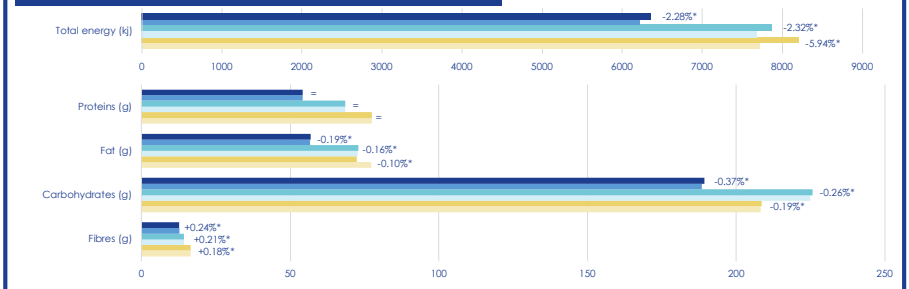
- **Scenario 1**: Industries commitments (CBD 2012-2017)

Breakfast cereals	+5% fibres, -4% sugars, (+8.5% whole grains)
Chocolates	-2,5% saturated fatty acids
Biscuits	-3% saturated fatty acids
Soft drinks	-5% average calorie content
Dairy products	-3% (added) sugars
Plant-based drinks	-4% sugars

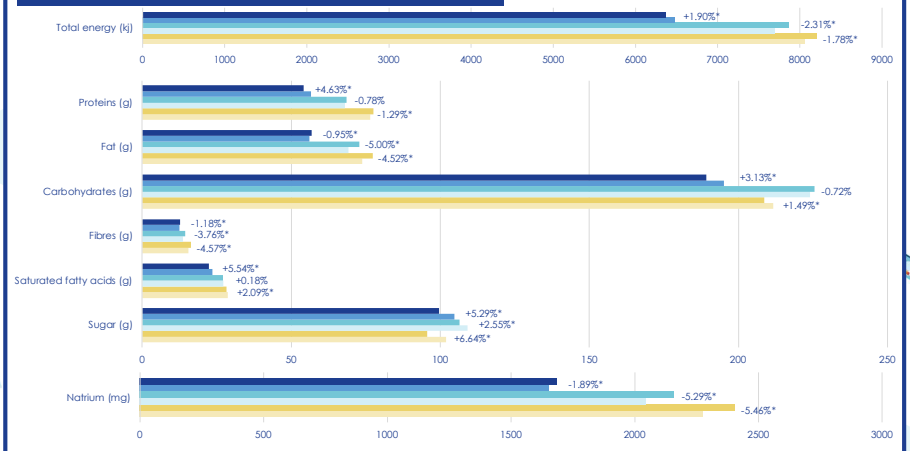
- **Scenario 2:** nutritional values were replaced by the nutritional values of the best possible Nutri-Score within each food (sub)category, based on the CBD 2012-2017.
- **Scenario 3**: a combination of scenario 1 and 2

Paired samples t-tests were used to compare values of total energy intake and macronutrient distribution before and after the application of each scenario, separately for each age group.

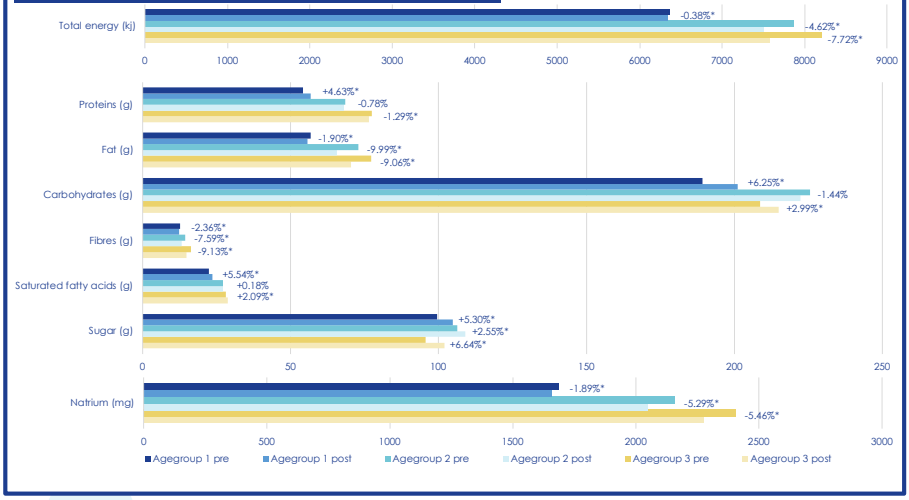
SCENARIO 1



SCENARIO 2



SCENARIO 3



CONCLUSION

Although improvements were small, recommendations such as the Covenant and Nutri-Score, can contribute to an improved diet quality among people of all ages.

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Is there a degree of asymmetry in phase angle in the upper and lower limbs of youth elite tennis players?

D'Hondt Joachim[1], Chapelle Laurent[1], Aerenhouts Dirk[1,2], Clarys Peter[1,2], D'Hondt Eva[1,3]

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Introduction: Tennis is characterised by repetitive unilateral loading which induces an asymmetric development in tennis players' body composition. This side-to-side asymmetry is reflected in both upper and lower limbs. Moreover, bodily asymmetries already seem to occur at an early age and have been associated with increased injury risk. A reliable non-invasive field method for assessing body composition is Bioelectrical Impedance Analysis (BIA). Recent BIA devices allow to derive segmental Phase Angle (PA) values as an indicator of cell membrane integrity. This BIA outcome is associated with body cell mass and water distribution and might be useful in assessing muscle quality. However, studies on segmental PA values in youth tennis players are currently lacking. Therefore, this study aimed to examine whole-body side-to-side differences in PA among youth elite tennis players.

Methods: PA values were determined using a multifrequency tetrapolar BIA in 26 youth elite tennis players (11.6 ± 1.1 years, 54% boys) and compared against a non-athletic age- and sex-matched reference population. Two-way repeated measures ANOVAs or Wilcoxon tests were used to examine side-to-side differences in both upper and lower limbs.

Results: Upper limb asymmetry in PA was more pronounced in the tennis players compared to the reference population, with the dominant limb displaying a significant higher value than the non-dominant limb ($p<0.001$). At lower limb level, a significant greater contralateral limb value was found compared to the ipsilateral limb in the tennis players ($p=0.035$), whereas a higher PA value was observed in the ipsilateral versus the contralateral limb in the reference population ($p=0.016$).

Conclusion: This is the first study to report a significant degree of asymmetry both at upper and lower limb level in youth tennis players' PA values. Since PA might be related to muscle quality, future research should examine to what extent asymmetries in PA might be indicative of injury risk.

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Is there a Degree of Asymmetry in Phase Angle between the Upper and Lower Limbs of Youth Elite Tennis Players?

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Introduction

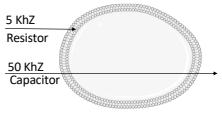
BACKGROUND

TENNIS

- Characterised by **repetitive unilateral loading**[1]
- Repetitive use of the dominant upper limb is associated with **side-to-side differences** in lean mass, bone mineral density, and bone mineral content from a **young age** onwards[1]
  - Upper limb asymmetry: dominant upper limb > non-dominant upper limb
  - **Cross-asymmetry**: ipsilateral lower limb < contralateral lower limb
- Asymmetry ↑ ⇔ **Injury** ↑[1]

PHASE ANGLE (PA)

- Measured with **Bioelectrical Impedance Analysis** (BIA)[2]
- Is an **index of membrane integrity**[2]
- Muscle mass ↑ ⇔ intracellular water ↑ ⇔ PA ↑[2]
- Total cellular mass ↑ ⇔ PA ↑[2]
- Extracellular water ↑ ⇔ PA ↓[2]
- Fat mass ↑ ⇔ PA ↓[2]
- Injury ↑ ⇔ PA ↓[3]



GAPS IN THE LITERATURE

- Research on PA in youth sports is scarce
- Literature on segmental PA in tennis is non-existent

AIM AND HYPOTHESIS OF THIS STUDY

- **Main objective:** To examine whether and to what extent there is a difference in PA in both the upper and lower limb of youth elite tennis players when compared to an age and sex matched reference population
- **Hypothesis:** To observe greater PA values in the dominant upper limb and contralateral lower limb compared to the non-dominant upper limb and ipsilateral lower limb, respectively, in youth elite tennis players and a more pronounced degree of asymmetry than the reference population

MOVEMENT & NUTRITION FOR HEALTH & PERFORMANCE RESEARCH GROUP

VRIJE UNIVERSITEIT BRUSSEL

Materials and methods

YOUTH ELITE TENNIS PLAYERS

CASE	• 14 ♂ 12 ♀ • Age: 10-14 y/o • Tennis-specific unilateral loading per week: 11.7 ± 1.1h • Recruited by convenience sampling through the Kids Development Team of Tennis Flanders and the French Tennis Association (Belgium)		Measured in research laboratory
	Segmental analysis with BIA : • PA • Lean mass • Fat mass	• Total segmental water • Extracellular water ratio (i.e. TSW/ECW)	
CONTROL	Segmental analysis with BIA : • PA • Lean mass • Fat mass	• Total segmental water • Extracellular water ratio (i.e. TSW/ECW)	Measured on school site
	• 14 ♂ 12 ♀ • Age: 10-14 y/o • Hours of unilateral loading per week: < 1h • Recruited by convenience sampling in a local school (KAE)		

REFERENCE POPULATION

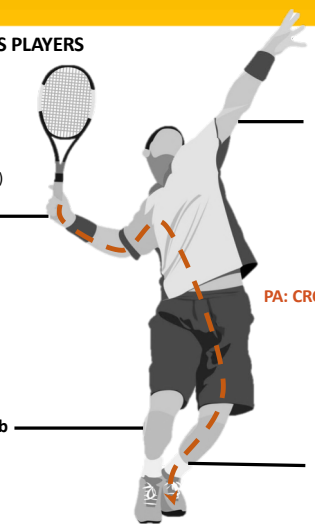
STATISTICAL ANALYSIS

- One-way repeated measures ANOVA
- Wilcoxon test

$$\text{ASYMMETRY INDEX} = \frac{\text{highest value} - \text{lowest value}}{\text{highest value}} \cdot 100 \text{ (in \%)}$$

Results

YOUTH ELITE TENNIS PLAYERS



Dominant upper limb
PA (p<0.001, 9.72%)
Lean mass (p<0.001, 5.82%)
Total segmental water (p<0.001, 5.28%)

Non-dominant upper limb
Fat mass (p<0.001, 12.19%)
ECW ratio (p<0.001, 6.58%)

PA: CROSS-ASYMMETRY

Ipsilateral lower limb

Contralateral lower limb
PA (p=0.035, 2.68%)

REFERENCE POPULATION

Dominant upper limb
PA (p<0.001, 4.89%)
Lean mass (p=0.040, 2.09%)
Total segmental water (p=0.037, 2.16%)

Non-dominant upper limb

PA: CROSS-ASYMMETRY

Ipsilateral lower limb
PA (p=0.016, 3.87%)

Contralateral lower limb

Fig. Graphical representation of the significant side-to-side differences at upper and lower limb level

Conclusion

✓ **First study to demonstrate**:
- Side-to-side asymmetry in PA in the upper limb and a more pronounced degree of asymmetry compared to the reference population
- Cross-asymmetry in the lower limbs' PA among the tennis players, whereas the reference population showed an opposite direction of asymmetry
- A significant upper limb asymmetry in fat mass, total segmental water and ECW ratio in tennis players

✓ **Corresponding to previous research**:
- The presence of asymmetry in the upper limb and the absence of asymmetry in the lower limb of youth elite tennis players in terms of BIA-based lean mass

✓ **TAKE HOME MESSAGE**:
- Repetitive unilateral loading elicits upper and lower limb side-to-side asymmetry in PA already at young age → Higher injury risk (?)

✓ **Future (longitudinal) research**:
- Should confirm our results and examine whether and to what extent these side-to-side differences in PA may be related to injury (risk) prevention and athletic development of talented tennis players

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TENNIS VLAANDEREN · aft · KAE ATHENEUM Etterbeek

Contact

✉ Joachim.DHondt@vub.be

VBSW symposium, December 2020

Development of a cognitively enriched walking program for older adults with experts and end-users.

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Introduction: About 50 million people worldwide suffer from dementia and this is expected to triple by 2050. Recent work shows that regular physical activity combined with cognitive activity may help to reduce cognitive decline through brain neuroplasticity. Yet this has only been evidenced in controlled, lab-based studies, it remains an important question if these findings translate to real-life situations. This project's aim is to develop a cognitively enriched walking program for older adults to reduce cognitive decline.

Methods: First, a panel of 27 researchers with relevant expertise (e.g., cognition, physical activity, neuroplasticity) helped to generate initial ideas about the program content. They were questioned in a series of three surveys until agreement was obtained about the list of cognitive exercises and practical aspects of the program. Next, 535 older adults (*M*age = 68.4 years, 54% female) were asked to rate attractiveness and feasibility of the cognitive exercises and the program ideas.

Results: Experts agreed that the program should target executive functioning, higher-order thinking, and memory and learning. Cognitive activities should have real-life relevance, last 15-20 minutes during a 30-min walk, and be performed 2-3 times/week. They agreed upon a list of 32 cognitive exercises (e.g., a search with clues). Fifty-seven percent of the older adults liked the program, while 60 % thought it was feasible. Main arguments against attractiveness and feasibility relate to interference with other goals of walking (e.g., relaxation, spontaneous social interaction). Main reasons for liking the program are cognitive challenge and group interaction. In contrast to experts' opinion they rather prefer 10-15 minutes of cognitive activity and to do this only once a week.

Conclusion: Expert opinion and older adults' preferences gathered in this first phase will inform the design of the pilot version of the program, which will be tested as soon as COVID-19 permits.

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Development of a *Cognitively Enriched Walking Program for Older Adults* with Experts and End-Users

Report - Phase 1

At the start of 2020 we questioned **27** researchers with relevant expertise

According to them our program should target:

1. *executive functioning & higher order thinking*
2. *memory & learning*

Their recommendations about the **cognitive activity:**

- activities with **real-life** relevance
- **15-20** minutes during *30-minute walk*
- **2-3x** per week

In consensus, we created a list of

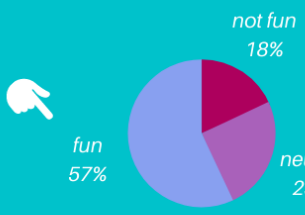
134 → 52 → **32** cognitive excercises

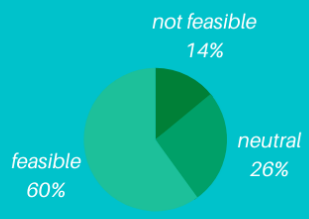
...and organized these according to **complexity**, **cognitive domain**, & **integration in the walk**

Next, we questioned **468** older adults & **67** coaches

Mage: 68.4 *years* | 46% | 54%

...they rated **attractiveness** and **feasibility** of the program and exercises





Top 5 *highest rated* cognitive exercises while walking:

1. *Discuss facts & tidbits*
2. *Do a search with clues*
3. *Practice awareness*
4. *Try to spot things*
5. *Discuss topics and opinions*

arguments PRO

" Because I like it"

" ...it promotes the group atmosphere"

"... it is challenging"

"...it makes the walk more interesting"

arguments CONTRA

" Because I dislike it"

"... it disrupts the peace and relaxation"

"...it disrupts social interaction in the group"

"...it hinders the walking pace"

Their recommendations:

- **10-15** min cognitive activity
- **1h** total walking time
- **1x** per week

attention points:

- age differences
- group size
- context/environment

Phase 2 → **Pilot Trial (Nov-Dec 2020)**

fwo

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21st century skills development and assessment in higher education: a systematic review

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Introduction: Recent studies have addressed the importance of developing and assessing 21st century skills in an educational context (e.g. Silva (2009), Griffin (2014) and Larson (2012)). Nevertheless, it remains difficult to identify, develop and assess these skills in a consistent and valid way. The main purpose of this systematic review is to provide an overview of different methods to develop and assess 21st century skills among students in higher education.

Methods: Following PRISMA guidelines, five databases, including Web of Science, PubPsych, EBSCOhost, Google Scholar and Scopus, were searched for studies that describe the development and assessment of 21st century skills in higher education. A total of 769 non-duplicate articles were retrieved from the databases. After the title, abstract, full text screening and backward and forward tracking 36 articles met the inclusion criteria and were included for further analysis. The quality of selected articles was critically evaluated, using the quality appraisal scores from Hawker. A content analysis was performed on the included articles.

Results: Preliminary results show that teaching methods like problem or project-based learning become increasingly important in the development of 21st century skills in higher education. A transition is noticed from summative assessment to a more formative type of assessment focusing on improving the students' skill development and giving them additional feedback. More detailed results of the systematic review will be presented at the symposium.

Conclusion: This systematic review contributes to the establishment of a framework to develop and evaluate 21st century skills in higher education and can be used by policy makers and practitioners to improve practice and stimulate further research. The opportunities and barriers that were found in the literature will contribute to evidence-based teaching and learning strategies and in this way to the educational effectiveness of '21st century skills'.

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21st century skills development and assessment in higher education: a systematic review

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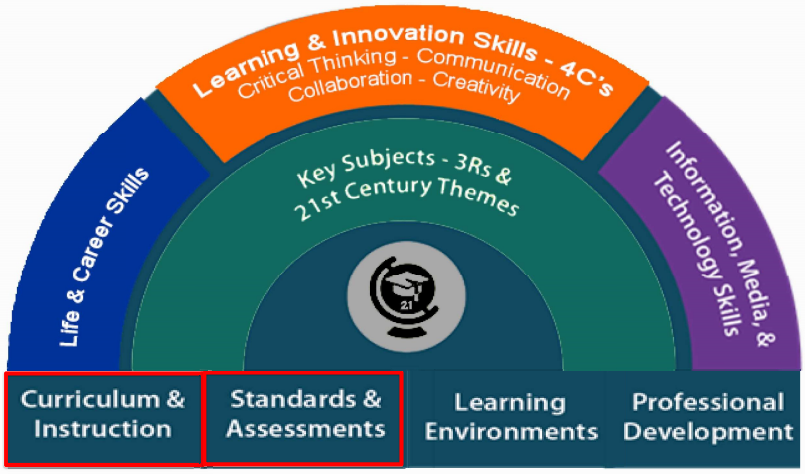
Introduction

Importance of developing and assessing 21st century skills in higher education in general and in MSc Movement and Sport Science in particular:

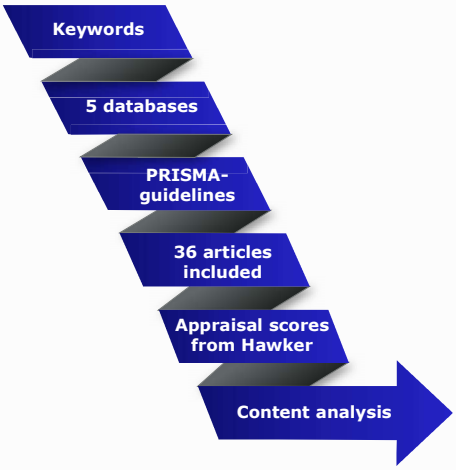
- Successfully enter the job market
- Able to tackle today's complex challenges, like globalization
- ↑ focus on competency development
- ↓ discrepancy between graduates' competencies & job market's needs

→ Increased career opportunities



Framework for 21st century learning[1]

Methods



Limitations

Currently, there are different definitions and classifications of '21st century skills', e.g. life skills, soft skills, transversal skills, employability skills, career skills, future work skills key competences for lifelong learning… Therefore, it is difficult to make a direct comparison of the different frameworks.

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Results A: Development of 21st century skills (Curriculum & Instruction)

The table below shows which 21st century skills increase for each learning strategy:

	Life and career skills	Learning and Innovation skills	Information, Media and Technology skills
Project-based Learning[2,3]	Self-direction Responsibility	Creativity Problem solving Communication Collaboration	Not identified
Problem-based learning & simulation[4]	Self-direction	Problem solving Communication	Not identified
Business game[5]	Leadership Responsibility	Creativity Innovation Communication Collaboration	Not identified
Work-based learning[6]	Leadership	Creativity Innovation Critical thinking Problem solving Communication Collaboration	Not identified

Results B: Assessment of 21st century skills (Standards & Assessments)

- Skill assessment tool (Likert scale), mostly a questionnaire
- Assessments are not interdisciplinary

Conclusion & practical implications

1. Reduced gap between job market's needs and competency development of students in higher education
2. Practice based learning → ↑ 21st century skills → valued by employers & benefits the future working career of students
3. Consultation with work field is necessary to confirm the importance of 'Information, Media and Technology skills' in higher education
4. More research is needed on how to measure and evaluate 21st century skills in higher education in a practical and transparent way

Develop a tool or app that can successfully evaluate students' 21st century skills:

- Throughout their academic career
- Transfer between different subjects

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