

## ECSS 2014: Exercise Science around the Canals

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Amsterdam was the venue for this annual top conference on exercise science. [Plenary Session Highlights](#): physical activity intervention, motor skills. [Research in Children](#): participatory child research; physical activity promotion; family setting. [School-Based Physical Activity](#): long-term follow-ups. [Biomechanics in Children](#): neuromuscular control; force production; musculoskeletal development. ["Inflammageing"](#): inflammation; muscle loss; sarcopenia; resistance exercise; biomarkers; muscle metabolism. [Ageing, Chronic Disease and Exercise](#): clinical populations; pacing strategies; cancer; interval training; prefrontal cortex activation; cognitive function; plyometric training. [Ageing, Chronic Disease and Nutrition](#): sports supplements; caffeine; beetroot; nitrate. [Biomechanics and Motor Control in Elderly](#): whole body vibration; neuromuscular fatigue; postural stability; risk of falling; walk velocity; cognitive decline; sitting time. [Workplace Wellness](#): employee health, physical activity counselling. [Obesity and Exercise](#): exercise response in obese people, physical education to prevent obesity. [Exercise Psychology](#): physical activity on cognitive functioning. KEYWORDS: physical activity, exercise, health, nutritional supplements, ageing, seniors, children, interventions, workplace, obesity. [Reprint pdf](#) · [Reprint docx](#)

The 19th Annual Congress of the European College of Sport Science (ECSS) hosted by VU Amsterdam and VU Medical Centre Amsterdam was held at the Amsterdam RAI Convention Centre, Netherlands, on the 2-5th July. The Congress consisted of a variety of keynote, plenary, symposium, oral, mini-oral, and e-poster presentations. The RAI provided an excellent venue, with suitable facilities and equipment for speakers and attendees to enjoy what was overall a high-quality conference. As in previous years and in line with the purpose of the ECSS, the congress attracted international, multi-cultural and interdisciplinary academics from across the world to present and discuss cutting-edge exercise and sport research. This report is the first focusing on exercise-related research at the ECSS conference. A [separate report](#) deals with sport research.

Despite limitations with some studies, much of the research was of high quality with beneficial implications for the identified population groups. In our opinion, research examining the

impacts of physical activity and exercise on health has become stronger and more prominent at the ECSS annual conference. We commend ECSS 2014 conference committee for the range of research on show and for organizing an informative event for attendees.

The [conference site](#) has program pages for each tier of presentation or a [PDF of the full program](#), all accessible via the [scientific program page](#). Videos of plenaries and some invited symposia can be accessed via the [ECSS.tv page](#) and the [login page](#) for ECSS members only. Members can also access all abstracts, mini-oral slides and e-posters via the [Amsterdam search form](#) or the [EDSS database](#). To find the presentations we have reviewed, copy the presenter's name and initial or the session code shown in brackets [...] into the search form at the ECSS site or into the advanced search form in the Adobe Acrobat PDF reader.

### Plenary Session Highlights

The plenary sessions provided some thought-provoking messages that sparked debate among

audience and presenters. For example, on Thursday 3rd July a plenary session titled **"Who has the future in public health – young or old?"** was led by Willem van Mechelen and Allard van der Beek [PS-PL04]. This is an important question from a public health perspective and for public and governmental funding institutions. In her keynote entitled "Bend the twig and bend the tree" Mai Chin A Paw suggested that greater investment in physical activity for young people is needed. She discussed the importance of children achieving physical activity guidelines and thereby developing motor skills. Importantly, and in line with the focus on a growing number of research studies, she suggested that it is important for children to move frequently throughout the day to reduce their sitting time. Reducing sitting time has become a topic of high interest and has featured at other conferences this year. This is certainly a line that other distinguished researchers have taken (Stuart Biddle and Nanette Mutrie, to name just two), but much of the research aimed at reducing sedentary time has been conducted in adult populations usually in work-based environments.

On the basis of her recent research, Chin A Paw suggested that by including children in the design of a study, which she referred to as **"participatory child research"**, interventions may be more effective. Previous research has examined the effectiveness of playground designs and markings, which have proven successful in some instances, but may be improved further by allowing children to participate in the design of their school environment. Such an approach may be an eye opener for adults and researchers and allows children to have a voice in relation to their health. She gave an example on how such an approach can be used in a practical setting in two schools. These examples, however, also highlighted a major limitation of such strategies, as the results differed between the schools and were perhaps biased by the views of particular children. To apply such approaches in future research, methodological work is required to obtain scientifically sound, valid and reliable data. Chin A Paw also acknowledged that future research should consider the psychometric properties of the intervention, but this new approach certainly appears to be effective in reducing sedentary lev-

els in children at school. She concluded that "healthier, informed kids, will have a better chance of growing into a healthy and happy old age... Since future generations are affected by the decisions that we make today, we need to invest in today's youth".

After these visionary perspectives, Colin Boreham talked about the case for **exercise promotion in the elderly**. He stressed the need for greater investment in research examination of the elderly, on demographic changes and associated economical perspectives, in an ageing society. Future research in this area should shift its focus from increasing life expectancy to increasing *healthy* life expectancy. Older adults usually suffer from chronic disease and frailty. There is compelling evidence that even low levels of training result in relevant and immediate adaptations or improvements, even if activity is started in later years. Better physical functioning and lower morbidity results in overall lower health-care costs. Boreham argued that children are the most active population (at least until the age of 12 years) and that health concerns in children are probably overrated. Moreover, although there is evidence that active children are also healthy children, there is a lack of sound scientific data showing that active children will become active, and more importantly, healthy adults. The most relevant argument for promoting exercise in children is based on the assumption that preventative measures at a young age reduce the likelihood of later chronic disease in adulthood. As long as there is a paucity of convincing evidence that this is indeed true, investing limited financial resources in exercise promotion in children seems a luxury. Combining demographic changes and the associated economic burdens with the evidence base makes a compelling case for public investment in physical activity in the elderly. Although not everyone might agree with the presented evidence, it seems reasonable that future research in children should focus on long-term health effects and tracking of physical activity behaviour from childhood to adulthood.

#### **Research in Children**

The discrepancy in sound scientific research focusing on children and the elderly was mirrored to some extent in the quality of abstracts in these domains at the conference. We detected

high quality research predominantly in original studies on seniors. Many presentations in children focused on the association between physical activity and motor skills or physical fitness of school children. There is already a huge amount of work establishing these associations. In a number of instances, the submitted and accepted abstracts differed only in the country where the research was conducted.

One presentation was impressive and innovative. Arto Laukkanen presented a study on the effects of a one-year family-based randomized controlled trial on physical activity and gross motor skills in children. This presentation achieved 4th place in the young investigators' awards. With only a few studies to date examining physical activity promotion in a **family setting**, this study contributes to an under-researched area. The main result was that giving tailored counselling to parents was insufficient to increase moderate-to-vigorous physical activity in their children but beneficially affected the development of ball-handling skills in girls. However, these results may not apply to families at the lower end of the socio-economic scale, as approximately three-quarters of the responding families were highly educated. From a methodological point of view, the study showed that the timing of interventions is an important element in countries with great seasonal variation. [Laukkanen, A]

For future research with children, it seems important to conduct long-term intervention studies with long follow-up, given that the evidence for tracking effects from childhood to adulthood or even until elderly is currently too weak to justify great financial investments in youth. However, long-lasting cohort studies providing end points to answer these questions satisfactorily may never be completed. One approach to justify investment in children may be to compare health predictors in youth and young adults in countries with great investment in youth physical activity as compared to countries that invest little.

### **School-Based Physical Activity**

An informative and thought-provoking session on school based physical activity interventions provided cross-continent evidence regarding the effectiveness of previous research [IS-SH07]. On the effectiveness of interventions in the US, Russell Pate reported that evidence for

short bouts of physical activity in class is emerging and that this strategy might be a useful alternative to more formal physical activity interventions. Pate's presentation was entitled "Long-term follow-up & implementation of school-based physical activity-interventions: myth or fact?" Pate also reported that alterations to the environment had sometimes been successful in short-term benefits but had been inconclusive in the longer term. In question time, we probed Pate for his thoughts on the fidelity of these types of interventions. He agreed that this has rarely been reported and is likely to be relatively low. In general, the fidelity of interventions should be monitored and reported.

In the second presentation of this session, Susi Kriemler presented the European picture of school-based physical activity interventions, including the Oslo Youth Study and the KISS Study. Her presentation entitled "Why do school-based physical activity interventions work in the short but not in the long-term" supported some of the effects reported by Pate in the previous presentation, with results from a three-year study she was involved in demonstrating short, but not long-term effects.

The final presentation by Heather McKay, entitled "Key factors for successful implementation and dissemination of a school-based physical activity model: a report from the trenches", was about a program implemented in Canada to impact health and physical-activity levels. Using a socio-ecological approach, the program offers children physical-activity opportunities and healthy eating advice and menus whilst at school. The program has existed for 10 years and is now hosted by over 1500 schools. McKay reported that the program appears to have been successful in increasing physical-activity levels and healthy eating in school.

This session was sponsored by the Coca Cola Company, a contentious partnership, given the link between sugary drinks and health concerns. The Coca Cola Company also had an exhibitor stand at the conference, which again seems misaligned with the general mission of the ECSS and many of the presentations in working towards a healthier lifestyle. Partnerships that companies such as the Coca Cola Company have with sporting events (e.g. Olympics) have long been a topic of debate and they now ap-

pear to have a greater presence at sports conferences. In our opinion, the partnership that the ECSS has with the Coca Cola Company should be reviewed.

### Biomechanics in Children

There was an interesting invited session on "Developmental changes of neuromuscular control and **muscle-tendon mechanics** in children: implications for muscular force production and movement performance" [IS-BN08]. Bill Baltzopoulos reviewed the scientific literature and showed that the lengths of muscle fascicles, muscles and tendon grow proportionally. Also, moment arms were larger in adults as compared to children. Growth-related changes in muscle-tendon mechanics likely affect muscular force production and complex movement performance.

In the subsequent presentation on developmental changes in muscle-tendon mechanical properties and their impact on muscular force production, Charlie Waugh talked about differences in movement **kinematics and kinetics** between children and adults and a possible association with an "immaturity" of the neuromotor system. The importance of the mechanical properties of the muscle-tendon complex on muscular force production in children has received little attention. Recent evidence demonstrates that the mechanical properties of the immature muscle-tendon complex are adaptable. These results may have implications for complex movement, motor-control strategies and movement disorders.

Anthony Blazevich finished the session with "The integration of **muscle-tendon characteristics** and neural control during multi-joint, rebounding exercise in children". The contribution of feed-forward and feedback activity to rebound ability on performance markers throughout childhood and into adulthood can be well-explained. Fatiguing exercise in children results in uniform changes in rebound performance and neural control. This supports a cause and effect relationship between neuromuscular control and rebound performance. Research shows that immature children perform rebounding activities with more inhibitory neural control and less short-term reflex activity. With development a greater reliance on and contribution from anticipatory feed-forward muscle activity during rapid rebounding tasks can be

observed. It might be speculated that the stiffness of the muscle-tendon and its ability to produce a rapid reflex response are pre-programmed in a feed-forward motor plan. It would be interesting to see how all of these biomechanical findings will affect age-specific neuromuscular training programs.

### "Inflammageing"

Given the increase in average life expectancy in the developed world, it was not surprising to see **age-related inflammation** feature in this year's program. Despite recognition of the importance of inflammatory responses in adaptation to exercise training within younger athletic populations, the elevations in low-grade inflammatory status associated with ageing ("inflammageing") leads to many health implications including onset of chronic diseases. Such debilitating outcomes were highlighted by Kjaer and Greenhaff's invited presentations [IS-PM03]. Inflammation can be considered a "friend" to skeletal muscle in young age through triggering key adaptations to exercise. Inhibiting these inflammatory responses may diminish, for instance, protein synthesis and satellite cell activation. With ageing, however, there is a continuous increase of **low-grade systemic inflammation**. Inflammation is therefore deemed both a friend and foe of skeletal muscle with the exact outcome being partly determined by the age of the individual. Inflammageing can be countered by exercise with beneficial effects on muscle loss and muscle growth response to resistance training. Paul Greenhaff showed that there is still a lack of evidence-based data on the specific mechanisms underlying the loss of metabolic and physiological functioning of skeletal muscle with ageing. He presented data on the biochemical and physiological basis of skeletal-muscle deterioration induced by inactivity and/or acute exacerbators of musculoskeletal ageing such as immobilization (short periods of complete inactivity).

As with many other biological states, the identification of **biomarkers** that reflect the processes of age-related muscle loss has become a research focus. There were 17 abstracts where the term *biomarker* was mentioned, and we expect the number to increase in future years with the use of biomarkers in risk stratification of patients and developing targeted ther-

apies. Marlene Hofmann presented results from a study that aimed to determine blood-based biomarkers at different stages of sarcopenia by obtaining samples from young and older participants. Biomarkers suggestive of the ageing process (IGF-1 and GDF15) were identified but did not discriminate between stages of sarcopenia. Although more work is needed in this area, it may be that the use of serum markers is not adequately specific for the target tissue and hence lacks the sensitivity needed to classify the degree of sarcopenia. Despite a low sample in this study compared to the norm of biomarker studies, the lack of findings is not uncommon for disease processes that have multifactorial etiology. [Hofmann, M]

Inter-fiber muscle fat infiltration may be associated with the **etiology of sarcopenia**. To date, little is known about the role of intramuscular triglyceride accumulation on muscle function. In this context, the intriguing study of Conte demonstrated that protein expression at the muscle can provide an insight into the mechanisms of sarcopenia. She analysed muscle biopsies from vastus lateralis in healthy donors and patients of different age groups and fitness levels to investigate the role of two proteins that surround lipid droplets within skeletal muscle (perilipins; Plin2 and 5) in the **regulation of muscle mass and metabolism**. She observed that Plin5 had greater expression in active subjects relative to patients, whereas Plin2 was more expressed in patients as compared to healthy subjects. Moreover, Plin2 increased with age. Thus, both perilipins are differentially regulated during ageing and inactivity and are likely to play different roles in muscle metabolism and in the etiology of sarcopenia. Modifications in Plin2 and Plin5 expression by either physical activity or pharmacological interventions might help to reduce muscle atrophy and counteract sarcopenia. [Conte, M]

Emelie Strandberg presented a randomized controlled trial on the effects of 24 wk of progressive resistance training with or without **anti-inflammatory diet** on systemic inflammation and muscle fibre characteristics in 63 physically active elderly women. She reported a significant increase in muscle mass and a decrease in the pro-inflammatory precursor arachidonic acid in the group exposed to the diet. Most interestingly, this study showed that com-

bined resistance training and anti-inflammatory diet but not resistance training alone can improve skeletal muscle mass and systemic inflammatory status in healthy and physically active elderly women. However, the effects were rather small and the statistics were not clearly reported. [Strandberg, E]

### **Ageing, Chronic Disease and Exercise**

Exercise is considered the cornerstone of treatment for many chronic diseases. This year we were introduced to not only the disease modifying potential of exercise but also its ability to impact age-related physiological decline. The number of presentations related to these research areas has increased considerably in recent years. Although there were specific themed sessions at the meeting (e.g., cancer and exercise), we felt it was necessary here to provide evidence of the wider potential of **exercise as a medicine** in chronic disease and as an efficacious intervention on the physiology of the older individual.

One challenge met by practitioners implementing exercise protocols in clinical populations is identifying an intensity that is both safe and offers optimal benefit to the patient. Alessandro Mezzani provided an insightful presentation on the importance of understanding the physiological responses to exercise domains for **exercise prescription in clinical populations** [IS-BN02]. Although he focused most of his talk on work in chronic heart failure patients, there were important discussions regarding principles of exercise prescription across clinical populations. An important point in relation to cardiac patients was that many responses of the aerobic and anaerobic energy systems to exercise (e.g., time to exhaustion at percent of peak power, percent contribution of anaerobic energy release to total energy requirement in all-out exercise) are similar between untrained and clinical populations irrespective of decrements in capacity induced by disease pathophysiology. The audience was informed of exercise domains that have been tested in different subpopulations of cardiac disease, which contributes important information regarding limiting risk associated with exercise prescription in this area. The take-home message was that patients with very low exercise capacity need only a very low exercise stimulus to improve!

Pacing research has become a very popular scientific field during the last decade. To date, pacing studies have focused mainly on athletes. Carl Foster presented interesting data about **pacing strategies in clinical populations** [IS-PM04] in which he argued that the concept of pacing is also relevant for other populations, as pacing is organized in terms of task completion. He presented data from 15 active non-athlete older adults (many with stable cardiovascular disease) during a fixed work task (100 kcal to finish as quickly as possible). The pacing pattern was similar to the pacing pattern described in athletes, except for a slower start. A high physiological and psychological strain indicates that participants were fulfilling the time trial with a competitive attitude and a large degree of goal organization, similar to athletes. We look forward to seeing whether the pacing concept will find its way further into non-athletic populations.

In a well-designed multi-centre prospective randomised trial, van Waart and colleagues examined the importance of exercise intensity on changes in physical fitness, fatigue and **chemotherapy completion rates** in patients undergoing adjuvant chemotherapy for breast and colon cancer. At six months follow up, high intensity structured, supervised exercise program produced a lower decline in cardiorespiratory fitness, enhanced muscle strength and less physical fatigue compared to usual care. Perhaps the most important influence on this population with high-intensity exercise was the greater completion rates of prescribed chemotherapy regimens compared to usual care. Although a lower intensity group (home-based, self-management physical activity) shared similar positive outcomes with the high-intensity group over the control group for physical functioning and nausea/pain, high intensity exercise during chemotherapy was shown to be most effective. [van Waart, H; third-place young investigator award]

**Interval training** is yet another intervention receiving increased recognition as a modality that can foster similar health benefits to those accrued from continuous exercise. Giannopoulou presented data from a study aiming to identify health improvements with 12 wk of interval training on a cycle ergometer in patients with chronic obstructive pulmonary disease. It was

concluded that interval training in this small cohort increased exercise tolerance independent of any changes in abdominal obesity. The relationships of abdominal obesity to overall health supported previous evidence but it conflicted with the study rationale/message. It was unfortunate that the role of other peripheral and/or central factors in contributing to the effects of interval training was not investigated. [Giannopoulou, I]

Despite the benefits of aerobic training alone in both clinical and healthy populations, an ageing population requires a combination of training modalities in order to combat age-related health decline. Although not a groundbreaking study, Teljigovic demonstrated that a 12-wk combined training intervention (aerobic and resistance) compared to aerobic only (same total training time) led to similar improvements in aerobic capacity but greater increases in strength. Yet another study to be added to the debate on adaptations to concurrent training, it does provide further evidence of the crucial role of exercise in healthy ageing. [Teljigovic, S]

Eggenberger presented “A NIRS study assessing changes in **prefrontal cortex activation during walking** in elderly following training”. He randomized 39 older adults either to combined physical and cognitive training (video-game dancing) or to an active control group (balance training). Prefrontal cortex activation at the initiation of walking was reduced in both groups after the 8-wk (24 sessions) training period with greater effects in the video-gaming group. Thus, a combination of physical and cognitive training might be a promising approach to influence prefrontal cortex function in older adults, possibly enhancing cognitive resources for other tasks demanding attention. [Eggenberger, P]

Coetsee showed that “progressive resistance training improves **executive cognitive function** in a healthy elderly population”. Forty-one elderly individuals were randomized into resistance training and control groups to investigate the changes in muscle strength and cognitive function during a 16 wk resistance training period. Four months of resistance training had positive effects on muscle strength (upper and lower body) and executive cognitive function (selective attention, shifting and the inhibition of habitual response). [Coetsee, C]

“Functional and architectural adaptations of skeletal muscle to a 6-wks plyometric training intervention in young and older men” were reported by Carter and colleagues. Most importantly, **plyometric training** (18 sessions in 6 wk) can be applied in older adults. Relevant adaptations were observed in muscle fascicle length (+11%), muscle thickness (+9%), pennation angle (+12%) as well as in leg extension power (+34%). All adaptations were greater in the elderly as compared to young controls. Although these results are of considerable importance, it’s worthy to note that this was a pilot study with only 4 seniors and 5 young controls. [Carter, AW]

### Ageing, Chronic Disease and Nutrition

Despite increasing awareness of the importance of nutrition alongside exercise as modifiable factors of ageing and/or disease prevalence/severity, there was a disappointing number of presentations on **nutritional interventions within non-athletic populations**. Greig emphasised in her invited presentation on “Maintaining muscle mass in old age” [IS-PM02] that future strategies should be of a multi-modal nature (exercise, nutrition and drugs) to optimize outcomes rather than viewing these interventions separately. Greig did indicate, however, that nutritional strategies for reducing muscle loss/function remain under-researched in older populations. Evidence to date shows potential for interventions such as protein and Vitamin D3 but their effects may be limited to specific situations (“young old” and those who are deficient at baseline, respectively). It was pleasing to see that there have been a few novel investigations into the potential impact of established and more recent **sports supplements** on parameters in non-athletic, diseased populations.

Skinner and colleagues aimed to determine whether **caffeine** (~6 mg/kg BM) could have effects on exercise-related fatigue and perception of effort in non-athletic populations similar to those reported in sporting situations. Fatigue-prone prostate-cancer survivors were also able to benefit from an increase in exercise tolerance (as measured by 400-m walk test) and had tendencies towards elevations in muscle strength, but this did not coincide with any influence on measures of fatigue or perception of effort. As the most frequently reported un-

derlying mechanism of performance enhancement (i.e. change in perceptions of effort or fatigue) in healthy (young and old) populations was not found in this study, further exploration of how caffeine facilitates exercise participation in prostate cancer survivors is required. Although the increases in systolic blood pressure and heart rate in this study can be explained partly by participants walking faster in this group, a risk-benefit profile of caffeine use in this patient population also warrants future investigation. [Skinner, TL]

In a nutrition and supplements session that included a large proportion of dietary-nitrate interventions, Shepherd presented findings from a study that attempted to discern the effects of four days of **beetroot supplementation** on health outcomes in people with Type 2 diabetes. Although increases in plasma nitrite were observed, there was no lowering of blood pressure and oxygen cost of exercise or increases in distance covered in the 6-min walk test. These data are in line with the lack of effects on blood pressure with longer-term supplementation (2 wk) and provide further support to suggest that positive outcomes seen in healthy young adults with nitrate supplementation may not be applicable to individuals with Type 2 diabetes. Due to the increasing evidence linking dietary nitrate and beneficial effects on health parameters, we would stress that further studies are required before we can exclude the role of nitrate supplementation in Type 2 diabetes. Given the heterogeneous nature of Type 2 diabetes, maybe it’s a case for its inclusion within a multi-modal therapy! [Shepherd, A]

### Biomechanics and Motor Control in Elderly

Vienneau aimed to compare muscle activity during **whole body vibration** between young and older adults. Surface EMG of seven lower leg and thigh muscles was recorded in 30 young and 30 older adults during standing with and without vibration. The elderly showed significantly higher muscle activity in tibialis anterior, peroneus longus, vastus lateralis, vastus medialis and biceps femoris. The authors speculated that the increased muscle activity in the older group might be due to an increased **neuromuscular fatigue** and that, therefore, whole body vibration may lead to greater neuromuscular adaptations in an older population. Therefore, whole body vibration training should be inves-

tigated further in older adults. [Vienneau, J]

Papegaaij examined the interaction between age and postural task difficulty in cortical excitability during standing. Eleven young and 12 old adults received **transcranial magnetic brain stimulation** while standing on stable or unstable surfaces, with opened or closed eyes. The authors observed that motor cortical circuits control upright posture differently in old vs young adults. [Papegaaij, S]

The question whether ankle muscle strength is associated with **postural instability** was evaluated by a research group from France. Cattagni measured maximal isometric torque during plantar and dorsal flexion as well as center of pressure path length displacement in four groups: 21 young adults, 11 middle-aged adults, 22 elderly non-fallers and 29 elderly fallers. The authors observed a log-linear relationship between maximal isometric torque and center of pressure displacement. Maximal isometric torque was appropriate to discriminate between fallers and non-fallers. A torque threshold of 3.1 Nm/kg was identified for compromised balance, with a sensitivity of 90% and a specificity of 89%. Therefore, ankle torque can be used clinically to determine **risk of falling**. [Cattagni, T]

**High-intensity interval training** has recently been recommended for several populations, including seniors, to effectively increase cardiorespiratory fitness. Whether high-intensity work can have detrimental effects on potential fall risk factors was investigated by Donath. He compared standing balance performance and lower leg muscle activity in 20 healthy seniors and 20 young men before and after a 4 x 4-min high-intensity interval session. He observed that postural sway and muscle activity were affected up to 30 min after exercise cessation. During this time period, there might be a higher risk of falling due to deteriorated postural control ("open-fall-window"). Thus, the advantage of high-intensity training with regard to time efficiency is debatable. [Donath, L]

Seniors show a higher **stability state** and walk more slowly compared to young adults, but their risk of falling while walking is higher. Mademli dealt with this paradox and hypothesized that older adults may move closer to their dynamic stability limits when walking at their preferred velocity. Whole body kinematic and

dynamic data were assessed at walk-to-run transition and preferred walking velocity in 12 elderly and 12 young men. The hypothesis was confirmed: older adults walked more slowly and were more stable, but they showed a significantly reduced safety factor during preferred walking. This means that older adults do not walk slowly enough in relation to their maximum walking velocity. [Mademli, L]

Marusic showed in 118 older adults that "gait parameters are sensitive to **cognitive decline** in older adults". Study participants were analyzed during single-task and dual-task walking (counting backwards in steps of three). Results showed that specific gait parameters can predict global cognitive function. Specifically, the dual-task cost of gait width and counting accuracy were the best predictors of cognitive impairments. The results of this study suggest that gait may be used for early detection of mild cognitive impairment, which is a precursor of dementia. [Marusic, U]

Piirtola conducted an interesting analysis on the effects of age, sex and body mass index as well as **heritability and environmental factors** on total sitting time among Finnish twins. A total of 6713 twin individuals (1940 complete twin pairs, including 732 monozygotic twin pairs) answered a self-reported questionnaire. The amount of sitting time decreased with increasing age and increased with increasing body mass index. Genetic factors had a moderate influence and environmental factors seemed to be more relevant. [Piirtola, M]

### **Workplace Wellness**

Within a theme of **lifestyle research** [OP-PM03] several oral presentations discussed findings from workplace interventions. Scaife presented a study entitled "Impact of an NHS workplace health promotion program on staff health and well-being: a feasibility study" [OP-PM03-3]. The study was conducted at Sheffield Teaching Hospital in the UK, where a **workplace wellness program** designed at Sheffield Hallam University was implemented. The program involved assessing participants on a range of health indicators, and where these indicators were outside of the recommended ranges, lifestyle advice and motivational interviewing were conducted. Findings suggested a number of positive differences in improving health indicators such as BMI, blood pressure and cholesterol

ol. Based on these results, the study certainly shows promise, but a large scale study possibly in the form of a randomized controlled trial is needed to provide strong evidence for the use of a workplace wellness program incorporating motivational interviewing and lifestyle advice [Scaife, R].

In the same session, a novel **wellness intervention** was presented by Malvela of LIKES Research Centre for Sport and Health Sciences, Finland entitled "Adequate working ability and low exhaustion is connected with good overall fitness" [OP-PM03-5]. The study presented consisted of a mobile lorry that was driven around Finland with a variety of fitness tests and health education for consumers who came to the lorry when stationary. Consumers received information about healthy lifestyles and avoiding ill health, such as reducing sitting time, and physical activity counselling was offered. In a similar vein to the workplace wellness presentation from Scaife, the results and novel approach taken by Malvela and her team require further evidence to substantiate the promising work presented at the ECSS. [Malvela, M]

### **Obesity and Exercise**

Overall the research presented at the ECSS on obesity and exercise, whilst interesting and informative, did not provide novel findings or progress knowledge. For example, there was a mini-oral session with the title "**Physical education and body composition**" [MO-PM05] where there were a number of studies presented that we hoped would extend our understanding of the role of physical education in schools and teachers in the prevention, management and treatment of obesity. However, we were disappointed by the lack of research not only aimed at reducing obesity but also the lack of new findings. The most promising research relating to obesity treatment in young people came in the form of physical activity interventions, which were designed to reduce inactivity and target health indicators associated with obesity rather than the condition itself (see school based physical-activity section).

Another session relating to obesity in exercise titled "**Exercise response to obesity**" [OP-PM15] again did little to advance knowledge of this area, and in some cases there were major limitations to the research. For

example, in studies presented by Martin [OP-PM15-2] and Garcia [OP-PM15-3], who had used the same sample for their respective studies, limitations included that the type of exercise the participants had engaged in prior to the study, was not accounted for and may have had an impact on the findings. [Martin, V, Garcia, S] Another study presented in the same session by Berntsen examining whether "obese children achieve maximal heart rate during treadmill running" [OP-PM15-1] compared two forms of exercise where the demands and duration of the activities were very different and incomparable. Thus whilst there appears to be a rationale to study the question, the conclusions drawn on the basis of the methodology appear flawed. [Bernsten, S]

### **Exercise Psychology**

In our experience, psychological research at the ECSS has not been as prominent as other disciplines, and this was the case in Amsterdam this year. Similar to the research examining obesity and exercise, there was a lack of novel research presented in the psychology sessions. One study of note presented within a session entitled enigmatically "HF ageing cognitive" [MO-PM61] with the title "**Acute exercise and fitness modulate cognitive function improvement in older adults**" presented by Shimura, provided details of a square-stepping exercise that was taught and used with older adult participants. Whilst the results did not necessarily advance current understanding of the impacts of exercise on cognitive functioning in older adults, the square-stepping exercise routine with increasing complexity as the participant progressed was certainly novel. With further testing, the square stepping exercise routine may provide an alternative and effective method, if future research confirms the positive results presented in relation to intellectual activity and physical fitness, for intervening with physical activity levels with older adults [Shimura, Y]. Major limitations of other research presented in the same session were evident; for example, Fiorilli presented results from a study titled "Different kinds of physical exercise for the **prevention of dementia** in older adults". The participants were appropriately divided into experimental and control groups, however, whilst the control group did not receive any treatment, there was a lack of information re-

garding their physical activity over the same time period, and they were simply measured at the end of the testing period. [Fiorelli, G]

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