EXERCISE SCIENCE + HEALTH
POSTER PRESENTATIONS

Tuesday, 27 March 2018
5:00pm – 6:00pm

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From Rat Model to Elite Athlete: What we can learn from animal research in Exercise Science?

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Introduction & Aims: Experimental protocols that use animal subjects have been developed when it would not be appropriate to use human subjects for studies of exercise’s impact, and the usefulness of rat models has long been acknowledged in exercise science studies. The advantage of rat models is the fact that they can be maintained in extremely controlled environments, enabling thus the isolation of selected variables responsible for the functioning of an organic system, which is not possible in human beings. Therefore these experimental protocols enables the utilization of a low sample size to achieve reliable results. This paper aimed to show a corpus of studies conducted in our laboratories using the rat model, which have contributed to a range of research studies in the field of exercise sciences.

Methods: Overview of results from our experimental studies and our own previously published articles.

Results: Our researches demonstrated that the higher doses of anabolic steroids induced the most deleterious impact on myocardial function and perfusion of the heart (coronary circulation). Furthermore, it has been established that anabolic steroids induce liver damage both in the nuclei of hepatocytes, and in the cytoplasm (mitochondrial enzyme activity and glycogen storage). Another series of experiments add evidence about beneficial effects of moderate-intensity training on blood and cardiac redox state of rats, and furthermore, showed that exercising frequently, if the intensity stays within moderate range, may not have detrimental effects on cardiodynamics.

Conclusion: Given the complexity of biological systems, the use of rat models has provided a profound understanding of the various biological phenomena, potential interventions, and adaptive mechanisms undergoing acute and chronic physical exercise, particularly when ethical considerations make the use human models unfeasible. It is very important that further studies directly compare human and rat responses to acute and chronic exercise for different variables and sampling points, in the same experimental design.
Reactivate: An Exercise and Self-Management Group Program for Adolescent and Young Adult (AYA) Cancer Survivors

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**Background:** Preparing AYA cancer survivors for rest of life health and wellbeing is an essential component of comprehensive cancer care. AYAs are known to experience a higher prevalence of all chronic health conditions including cardiovascular disease, diabetes, and obesity than healthy peers and siblings, all of which can be modifiable via exercise and lifestyle choices. With this in mind ReActivate, a goal-orientated rehabilitation program was designed for AYA cancer survivors.

**Method:** Participants aged between 15-25 years of age undertook the program at the completion of systemic cancer therapy. Participants were assessed pre and post program and included functional measures of fitness, quality of life and occupational performance. Each week for 8 weeks, participants undertake 2 hours of supervised exercise in a group environment, followed by a 1 hour education/ self-management session addressing a range of topics including, fatigue management, diet and exercise post-treatment and accessing supports in the community.

**Results:** While 25 participants commenced ReActivate, 20 (80%) participants completed the programme. They were administered a range of physical functioning measures, including the 6-minute walking test, push ups, sit to stand, and grip strength, and the self-report Pediatric Quality of Life (PedsQL) scale at baseline and post-programme. A series of Monte Carlo (B = 10,000) paired permutation tests indicated statistically significant differences in baseline and post-programme across all the physical functioning measures (Cohen’s d range = 0.59 to 2.25) and the PedsQL scales of physical functioning, social functioning and school functioning (Cohen’s d range = 0.80 to 1.01).

**Conclusion:** Results of this program support the acceptability and feasibility of a supported self-management group program for AYA survivors. ReActivate has the potential to improve AYA cancer patient's physical functioning, health literacy, self-management and long-term health and well-being. Future intervention work is needed to embed this work into standard clinical practice.

Participation Motivation of Saudi School Children with Different Body Mass Index towards Physical Activities

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**Introduction:** It is a common belief that motivation plays a major role in participation in physical activity. The objective of the study was to identify and compare the participation motivation of Saudi school children with different BMI towards physical activities.

**Methods:** Total 280 school students (M age 17.65±0.95 years) were selected at random from Dhahran, Saudi Arabia. MPAM-R (Ryan et al., 1997) used for data collection. On the basis of WHO, BMI categorized into underweight (n= 39), normal weight (n=128), overweight (n=64) and obese (n=49). Rank order was applied to identify the ‘most important reasons’ and ‘least important reasons’ for participation. ANOVA and Tukey’s post-hoc comparisons were calculated for significance of difference among BMI categories.

**Results:** Saudi school children rated the most important reason for participation was ‘appearance’ and ‘fitness’ factor and the least important reasons for participation motives was ‘social’ factor in all categories. ANOVA revealed significant difference among BMI categories on ‘appearance’ (F(3,276)=3.369, p=.019). Further, Tukey’s post hoc determined significant difference in underweight and overweight students. No significant difference was observed on other factors.

**Conclusion:** Students exhibited the highest scores of motivation factor as ‘interest/enjoyment’ followed by ‘competence’, which reflects intrinsic motivation. Most important reasons for participation were ‘appearance and fitness’ factor - improve body shape and maintain weight to look better, having good physical fitness, maintaining physical strength to live a healthy life. Self-Determination Theory (SDT; Deci & Ryan, 1985) stated fitness motives reflect relatively autonomous form of motivation represented identified regulation (personal values), whereas appearance-based motives are extrinsic in nature, tending to reflect introjected regulation. The least important participation motives of students were social factor (want to meet new people).
"But What Job Can I Get!?" The Career Destination, Progression and Satisfaction of Exercise and Sports Science Students in Australia

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Introduction and Aims: The availability of higher education courses in exercise and sports science has increased exponentially in the last 20 years. Graduates of these courses may have a wide scope of career possibilities, but the distribution of the occupations has not been well-defined.

Methods: Graduates of Australian exercise and sports science undergraduate courses (n=747) were surveyed online about their occupation and employment conditions, as well as their career progression and career satisfaction. Results: Of those surveyed, 70% were employed in the exercise and sports science workforce. The occupations of those in the workforce were predominantly accredited exercise physiologists (29%), personal trainers/fitness instructors (9%), teaching and/or research academics (8%) and occupational rehabilitation consultants (5%). For this workforce, 57% were employed full-time, 25% were employed part-time and 18% were employed on a casual basis. The major factors that enhanced progression were personal skills (31%), gaining experience (20%), networking (20%) and 41% of graduates volunteered in their current role before being paid. Less than 50% of the workforce agrees that they have clear development opportunities or a clear progression pathway in their profession. For those in the exercise and sports science workforce, 35% were extremely satisfied and 48% were somewhat satisfied with their current situation.

Conclusion: Despite most graduates obtaining exercise and sports science employment, many are part-time or casual and still seeking full-time work. The workforce is highly educated, and well supported, but many professions lack development opportunities or a clear progression pathway. Despite these challenges, most of the workforce is satisfied with their job and plans to remain in their profession indefinitely.

Restoration of Sinus Rhythm Improves Exercise Capacity in Patients with Persistent Atrial Fibrillation: A Meta-Analysis

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Introduction and Aims: Atrial Fibrillation (AF) is the most common cardiac arrhythmia affecting 1-2% of the global population. Reduced exercise tolerance is a commonly reported symptom of AF. This meta-analysis assesses the changes in exercise capacity in patients with persistent AF on restoration of sinus rhythm (SR).

Methods: MEDLINE/ EMBASE/ COCHRANE were searched for studies reporting changes to exercise capacity following restoration of SR via cardioversion or catheter ablation in patients with persistent AF. From the search 618 articles were identified. After exclusions, 13 studies reporting changes in exercise capacity with or without the restoration of SR were selected. Data was analyzed by a random-effects meta-analysis.

Results: Thirteen studies (1,643 individuals with persistent AF, 60±3 years) analyzed change in exercise capacity parameters using oxygen uptake, METs, duration and 6MWT. Exercise capacity significantly improved following successful restoration of SR compared to those who remained in AF (Standardized Mean Difference: 1.91, 95% CI 1.19-2.63, p<0.001, I²=97%). Both treatment modes significantly favor improvements in exercise capacity in SR with moderate effect size with ablation (n=3) (SMD: 0.98, 95% CI 0.03-1.92) over 24±2 weeks and large effect size with cardioversion (n=10) (SMD 2.19, 95% CI 1.30-3.09) over 20±24 weeks. There were significant increases in mean differences across all exercise parameters in SR; oxygen uptake (5ml/kg/min, 95% CI 4.09-5.79), METs (3.2, 95% CI 2.5-3.87), duration (73secs, 95% CI 38.85-106.59) and 6MWT (55.15m, 95% CI 45.37-64.93).

Conclusion: Successful restoration of SR results in an objective improvement in exercise capacity and may allow AF patients to engage in more active lifestyles and enhance quality of life.
Greater Cardiorespiratory Fitness Reduces Atrial Fibrillation Incidence: A Meta-Analysis

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Introduction: The prevalence of atrial fibrillation (AF) has increased over the past two decades. Regular aerobic exercise and subsequent improved cardiorespiratory fitness (CRF) has shown to reduce the risk of known cardiovascular diseases. In AF there are many studies now analysing the relationship between exercise and AF risk, with varying results. This meta-analysis aims to assess studies that have analysed the relationship between CRF measured at baseline by a symptom-limited exercise stress test and AF risk at follow-up.

Methods: The systematic literature review was conducted using PUBMED, MEDLINE and EMBASE databases, with four studies meeting the inclusion criteria. A random-effects meta-analysis was then used to compare the multivariate risk estimates of the lowest CRF group from each cohort with the group of the highest CRF.

Results: A total of 77,270 individuals (59.3% males) was used for data analysis with a mean age of 55.8±2.8 years and a mean follow-up period of 10.7±6.1 years. Across the studies CRF was defined in METs, with AF diagnosis detected via medical records and/or study ECG. The total number of AF events across the studies was 5,937. The pooled risk of AF in the high-CRF group versus the low-CRF group showed a significant lowered risk of incident AF 0.62 (95% CI, 0.40-0.95, p=0.03). Calculated AF incidence rates per 1000 person-years shows an overall decline in rates across the CRF quartiles from low to high CRF. Calculated mean incidence rates for low-CRF was 20.8±13.7 compared for high-CRF of 6.5±1.4 (p<0.01).

Conclusion: There is an independent relationship between a higher CRF and a decreased incidence in AF. Increased CRF improves other known AF risk factors and may be a target for improving outcomes in patients at risk of or with AF.

Muscle synergy analysis in children with spastic hemiplegia

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Children with spastic hemiplegia present with an asymmetrical gait pattern due to a unilateral brain lesion. Muscle synergy analysis is a statistical tool used to understand the complexity of neuromuscular control and has been shown to distinguish between children with cerebral palsy across GMFCS levels. The aim of this study was to assess muscle synergy patterns of the lower limb in children with spastic hemiplegia during walking. We hypothesised that motor control strategy utilised during gait would be less complex in the affected limb compared to the unaffected limb.

The QCMAS database was queried for children diagnosed with spastic hemiplegia who had completed a 3D clinical gait analysis. Raw electromyography (EMG) data from five lower limb muscles was recorded at 1000Hz, and underwent a series of filtering, rectification and resampling. The resampled data from five gait trials were concatenated and non-negative matrix factorisation was used to segregate data into vectors and coefficients. The total variance accounted for by the first synergy was greater in the affected side (75.9%) compared to the unaffected side (68.7%, p<0.01). The total number of synergies required to described over 90% of variance in muscle activity was reduced in the affected side (2.9) compared to the unaffected side (3.3, p<0.01). Children with spastic hemiplegia displayed a more simplified movement strategy on their affected side compared to their unaffected side during walking. Muscle synergy analysis offers an objective quantification of neuromuscular control that could provide valuable information for possible treatment strategies in children with cerebral palsy.
Does the addition of two exercise-focussed home visits to usual care improve outcomes for patients with balance impairments? A randomised controlled trial

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Objective: To investigate if two additional home visits improve outcomes for rehabilitation outpatients with balance impairments compared to usual care.

Design: Randomised controlled trial.

Setting: Outpatient rehabilitation.

Participants: 50 with balance impairments.

Interventions: Both groups received usual care including weekly group exercise over eight weeks. The intervention group also received two home visits to prescribe and support individualised home exercises.

Outcome measures: Primary outcome measure was the Balance Outcome Measure for Elder Rehabilitation (BOOMER) score and secondary outcomes included force platform measures using the NeuroCom Balance Master4, assessed at baseline, after intervention, and three-month follow-up.

Results: There was no between-group difference for BOOMER score. There were significant between-group differences in support of the intervention group for limits of stability reaction time at week 9 (MD -0.27, 95% CI -0.44, -0.09) and week 22 (MD -0.28, 95% CI -0.45, -0.10) and for limits of stability maximal excursion at week 9 (MD 8.66, 95% CI 1.67, 15.65) and week 22 (MD 14.58, 95% CI 7.59, 21.57). Significant between-group differences favoured the control group for clinical test of sensory interaction of balance at week 9 (MD 0.40, 95% CI 0.13, 0.66) and week 22 (MD 0.45, 95% CI 0.18, 0.72) and step quick turn time at week 9 (MD 0.56, 95%CI 0.02, 1.10).

Conclusions: Two exercise-focussed home visits improved some dynamic balance outcomes in older patients with balance impairments. Some outcomes showed significant improvements with small effect sizes in favour of the control group which may be chance findings or because they completed a standard home exercise program.

High-intensity interval training in the metabolic syndrome: a meta-analysis

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Introduction & Aims: Aerobic exercise is recommended in the primary management of the metabolic syndrome (MetS). However, the literature is limited on the efficacy of high-intensity interval training (HIIT) and how it compares to moderate-intensity continuous training (MICT). This study aimed to meta-analyse HIIT in participants with MetS.

Methods: 5 electronic databases were systematically searched from 1998 to September 2017. Included studies were randomised trials that included HIIT for >4 weeks in adults with MetS, compared to either non-exercise control or MICT. Outcomes for meta-analysis included MetS criteria and cardiopulmonary fitness.

Results: From 252 search results, 7 studies with 8 exercise interventions (211 participants) were included, 8 to 24 weeks in duration. HIIT was conducted for 36 ± 12 minutes, 3 days/week. Compared to MICT (5 studies), HIIT required 56% less time commitment to exercise (range 60% to -27%) with no difference observed between groups for any outcome measure (p > 0.05). Compared to control (4 studies), HIIT decreased waist circumference -2.8 cm (-4.1, -1.5; p < 0.0001), fasting blood glucose -0.58 mmol/L (-1.04, -0.12; p = 0.01), systolic blood pressure -7.04 mmHg (-12.8, -1.3; p = 0.02) and diastolic blood pressure -5.5 mmHg (-9.8, -1.1; p = 0.01). HIIT increased cardiorespiratory fitness 5.6 ml/kg/min (2.9, 8.3; p < 0.0001) but no difference was observed for high-density lipoprotein or triglyceride levels.

Conclusion: HIIT is an effective exercise regime to increase cardiorespiratory fitness, decrease waist circumference and blood pressure, and improve glucose regulation, in MetS. With HIIT requiring less of a time commitment than MICT, this may be a more effective prescription in time-poor persons with MetS.
Protocol for the SEcReT Study: Supervised Early Resistance Training (SEcReT) compared to usual care for reducing cognitive decline following median sternotomy: a randomised pilot study

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Introduction: MILD cognitive impairment is considered a precursor to dementia. It is prevalent, and often unrecognised, in patients awaiting surgery. Permanent cognitive decline is experienced by a significant number of patients post-cardiac surgery and the incidence of dementia is accelerated. This causes substantial personal and family suffering, and a high cost to the health care system. Cognitive impairment and dementia affects the elderly at higher rates, and these are the patients that typically undergo cardiac surgery. Thus, it is a concern that needs to be addressed. Resistance training mediates the pathways associated with cognitive decline and sarcopenia. The shorter duration is safe for those with compromised cardiovascular function, and may also prove less burdensome for patients with low aerobic capacity, mobility limitations or frailty. However, the effectiveness of resistance training in elderly cardiac patients is unknown. Our study tests the safety and feasibility of moderate intensity resistance training and its effects on cognitive recovery compared to standard low intensity exercise.

Aim: To determine whether moderate intensity resistance training is safe and feasible following median sternotomy.

Methods: Patients ≥65 years, undergoing coronary artery bypass grafting via median sternotomy.

• Recruited from two hospitals in Melbourne, Victoria, Australia.

• Moderate intensity resistance training (n=50) vs standard low-intensity exercise (n=50).

• Assessment and comparison of cognitive function, independence, post-operative recovery, muscular strength, lung capacity, sternal stability and major adverse cardiovascular and cerebrovascular events.

Discussion/Conclusion: Resistance training may result in a greater improvement in cognitive function compared to standard phase ll low-intensity exercise. Thus it may present as an effective primary prevention strategy for cognitive decline and progression to dementia following cardiac surgery.

Health related physical fitness of learners with cerebral palsy aged 10-16 years at Tshilidzini Special School

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Movement and posture problems in cerebral palsy may lead to impairments in physical fitness and physical activity level in persons with cerebral palsy. Low physical fitness may result in high physical strain during activities of daily living activities (ADL), possibly leading to a reduction in activity, and, consequently, further decreasing physical fitness. The aim of the study was to investigate the health related physical fitness components of children with cerebral palsy aged 10-16 years, to achieve this aim the researcher had to adopt descriptive analytical approach. The sample of the study consisted of 61 participants, in which 31 were females and 30 males. The researcher had four objectives, which were measured using respective instruments for each objective, skeletal muscle strength which was measured using hand grip held dynamometer; flexibility which was measured using goniometer, body mass index measured with weighing scale and stadiometer, body fat percentage measured with skinfold caliper (two skin folds sites triceps, subscapular, and/or calf). Data were analyzed and treated statistically through the use of SPSS by using mean, standard deviation and t-test. The findings indicated that the health related physical fitness component of children with cerebral palsy at Tshilidzini special school was low and showed strength and flexibility of children with cerebral palsy at Tshilidzini special school being significantly poor. BMI and body fat percentage of children cerebral palsy were high. The statistical analysis of this study indicated a significant low level of health related physical fitness components which included muscle strength, flexibility, and body composition of children with cerebral palsy aged 10-16 years at Tshilidzini special school, however the findings indicated...
that females with cerebral palsy at Tshilidzini special school had high BMI, body fat percentage and flexibility than males with cerebral palsy.
Barriers and Enablers for Volitional Physical Activity in South Australian Aged Care Support Workers

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Introduction and Objectives: Community-based support workers have roles that may present unique barriers to maintaining healthy behaviours, including regular physical activity (PA). Understanding barriers to and enablers of PA was the objective of this study, and will be important for the design and implementation of interventions to promote PA behaviour in this population.

Methods: Support workers (n=10) recruited from ACH Group participated in telephone interviews that were transcribed and analysed using a structured thematic approach. Themes and sub-themes were developed within the overarching themes of Barriers and Enablers.

Results and Discussion: The most common barrier, time (not having it), generally related to competing priorities (home / family). Other barriers included environmental, individual (i.e. injury and motivation), and work factors (i.e. physical work and scheduling). Enablers included time (making it), individual, and work factors. Social support was identified as a potential enabler; however the need for flexibility due to variable work schedules, may mean that programmed group exercise would not be feasible for health promotion in this population. Surprisingly, self-efficacy was not reported as a barrier, possibly due to current, or past, PA participation. Self-efficacy did not necessarily enable PA participation in this sample either. Age appeared to influence activity choices, patterns, and motives.

Conclusion: The interviews identified occupation-specific factors, in addition to expected factors, that contribute to participation in PA. Strategies to address the barriers and optimise enablers will be targeted in the design and implementation of a PA program for this population.

Reformer Pilates: An Alternative Method for Diabetes Management

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With approximately 280 Australians developing some form of diabetes daily (Russell et al., 2017), there is great importance for effective management and prevention. Due to an increase in diagnosis comes an increase in personal preference and therefore adherence to treatment options (Milne et al., 2013). Metformin is viewed as ‘first line of defence’ for treatment of type 2 diabetes (T2DM); however, recent studies have shown that lifestyle therapy is twice as effective as metformin in diabetes incidence (Knowler et al., 2002). Pilates has a growing popularity as a form of exercise since development in the early 1900s. This emphasises quality of movement aiming to improve strength and flexibility (Ozen et al., 2012).

It is recommended that adults (including those with diabetes) accumulate 150-300 minutes of aerobic exercise and resistance exercise per week (ACSM, 2017). The direct effects of Pilates on blood glucose levels and other metabolic measures with respect to specific duration and intensity needs to be further investigated (Hagner-Derengowska et al., 2016); however, there are copious amounts of research supporting the benefits of regular Pilates, in conjunction with regular aerobic exercise, in improving weight status, strength, postural control, flexibility, autonomy, psychological wellbeing and therefore overall quality of life (Curi et al., 2017). Individuals with diabetes benefit from regular exercise to assist with weight management, muscle mass development and therefore glucose uptake and insulin sensitivity (Vadstrup et al., 2011). Pilates is versatile in being able to modify exercise to clients individual needs; therefore, this form of resistance training, if implemented effectively, may be an alternative, effective method for diabetes management. Following the latest research in treatment and rehabilitation, the use of reformer Pilates in a tailored exercise regime, can provide a successful alternative treatment for individuals with diabetes.
Cancer survivors’ cardiac autonomic responses: Implications for exercise prescription

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Background: The prevalence of autonomic dysfunction in cancer survivors requires further investigation. As support for high-intensity exercise for this population increases, the need to assess exercise readiness for physiological adaptations arises.

Method: The randomised crossover design included 12 primary cancer diagnosis participants (age mean ± SD: 58.58±12.05 yrs, male=3). All completed treatment within the last two years. A moderate (50% VO2peak) and high (80% VO2peak) intensity cycling session was completed. Time and frequency heart rate variability (HRV) domains were recorded before exercise, during recovery up to 30min and at 24 and 48h post-exercise. An analysis of covariance (two-way ANCOVA) with Sidak’s post-hoc testing was performed to compare HRV recovery over time in response to the two intensities. Age, weight, BMI, VO2peak and date of treatment were covariates. Significance was set at p<0.05.

Results: There were significant interaction effects between the recovery from moderate versus high-intensity exercise for heart rate (p<0.0001), R-R intervals (p=0.005), Log(Ln)RMSSD (p=0.0017), LnSDNN (p=0.0013), LnLF (p=0.0172), LnHF (p=0.0054), LnVLF (p=0.0053), and total power (p=0.0003). The major findings were 1) HRV returned to pre-exercise levels by 24h for both intensities, 2) cardiac parasympathetic activity (LnRMSSD, LnSDNN, LnHF) remained significantly lower 30min post high-intensity, 3) parasympathetic decline and disturbance to the heart’s intrinsic rhythm were most significant at 10min, and 4) there was a negative effect of age and weight on HRV.

Conclusion: Exercise intensity influenced acute and intermediate cardiac ANS recovery. Analysis of HRV in cancer survivors is potentially useful tool in clinical practice. We recommend monitoring HRV before exercise and across recovery to ensure appropriate exercise prescription.

Autonomic dysfunction in cancer patients and the influence of exercise: A systematic review

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Background: The growing population of cancer survivors are facing new challenges beyond their diagnosis, in relation to cardiovascular health and autonomic dysfunction.

Objective: This review aimed to explore autonomic dysfunction and the exercise-related effects on markers of autonomic function.

Methods: We conducted a systematic review in accordance with The PRISMA Statement in four databases (2017): PubMed, SPORTDiscus, Rehabilitation & Sports Medicine Source, CINAHL Plus. The search was limited to human studies in peer-reviewed English language journals. All cancer types and treatments were included provided the study involved a marker of autonomic function (e.g. heart rate variability, HRV, or recovery, HRR) in relation to exercise capacity. Search terms included: cancer, exercise, physical activity, cardiorespiratory fitness, aerobic capacity, autonomic nervous system, autonomic dysfunction, neuroimmunomodulation, vagal nerve, heart rate variability, recovery.

Results: Eight studies of mixed diagnosis cancer patients were included. The clinical importance of autonomic dysfunction was demonstrated by an evident reduction in HRV, HRR and Composite Autonomic Scoring Scale, at baseline before an exercise intervention and in response to cardiopulmonary exercise testing. Moderate intensity aerobic exercise interventions of two to twelve months were most frequently used and produced significant improvements in autonomic dysfunction.

Limitations: Low levels of evidence, relatively small sample sizes and heterogeneity, the presence of confounders and use of observational study designs are the key limitations.
Conclusions: Due to the association between having a higher HRV and quicker HRR post-exercise with prolonged survival, sustained exercise participation may be an important goal for improving autonomic function. Further, regular monitoring and measurement of autonomic dysfunction by clinicians may guide interventions to attenuate the adverse effects of cancer.
Does telephone and text behavioural support improve adherence to a community based obesity management program? A randomised cross-over trial

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Reducing the prevalence of obesity remains a major public health challenge, demanding effective, broad-scale interventions to support weight management & health behaviour change. The intensive approach seen within academic lifestyle intervention programs is effective, but requires considerable resources including time & money. It may therefore be considered too burdensome & expensive to be sustainable in a community environment. In order to translate the success of academic lifestyle interventions into community settings, we must explore innovative ways to adapt these approaches. Offering patient-provider support via mobile technology offers a potential way to reduce face-to-face contact, thereby lowering the cost, time and burden of obesity management programs. Emerging evidence supports the efficacy of providing technology-delivered extended contact interventions to support weight maintenance after the completion of a lifestyle intervention program. However this is the first study to explore the use of technology as an adjunctive tool to support a community-based obesity management program. This 8-month randomised cross-over trial (due for completion in July 2018), is designed to determine if the addition of telephone & text message support to a community based obesity management program improves lifestyle intervention adherence & clinical outcomes when compared to standard care. The intervention involves monthly telephone calls & individualised text message support, grounded in behavior change theory, for a period of four months in addition to standard care within the ACT Health Obesity Management Service. Key outcome measures include diet & physical activity adherence, self-efficacy & weight. If the additional support intervention proves effective, we may be able to improve access and flow of patients through health care services, as well as treatment outcomes, while reducing the burden of face-to-face care and resources such as time and money.

Exercise testing improves early detection of cardiac injury in asymptomatic cancer survivors

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Introduction & Aims: As a result of advances in treatment, the prevalence of childhood cancer survivors is increasing. In Australia, survival rates are ~85% at 5 years and 75% at 20 years. Unfortunately, long term effects of treatments that saved their lives are common, and include accelerated cardiovascular (CV) disease and heart abnormalities, with 56% of all survivors developing a heart abnormality. Frequently, evolving cardiovascular changes do not cause symptoms, remaining latent until manifesting as advanced disease, which is both difficult and costly to treat. Current CV screening guidelines uses echocardiograms, which are done at rest. In the early stages off CV disease, exercise testing may unmask cardiac abnormalities and cardiovascular risk factors otherwise undetected during rest (Abdulla, 2013) We assessed functional capacity (cardiorespiratory fitness, CRF) and cardiac function under the stress of exercise (exercise stress echocardiography, ESE) to determine whether the addition of exercise can detect preclinical stages of cardiac disease in young adult survivors of childhood cancer.

Method: 15 asymptomatic survivors of acute lymphoblastic leukaemia (ALL) underwent VO2peak and ESE testing. Echo images were obtained at rest, peak exercise and following recovery to assess chamber size and biventricular function by 2D, 3D imaging, 2D speckled strain analysis & Doppler assessment.

Results: 10 Males, 5 Females with mean age 18.8 ± 3 years. The mean VO2peak was 40.72 ± 12.42 ml.kg⁻¹.min⁻¹. All patients had normal resting echoes. Exercise unmasked significant reductions in cardiac strain at peak exercise & recovery. When compared to baseline values, global longitudinal strain reduced by 21.8% & 7.6%, global circumferential strain by 16.5% & 10.5% at peak exercise & recovery respectively.

Conclusion: Exercise based testing can detect early cardiotoxicity in asymptomatic cancer patients.
The effects of exercise time-of-day on sleep architecture

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Many adults remain physically inactive, despite the benefits of exercise for sleep. Methods to improve exercise compliance may include preferential time-of-day or engage in short-duration, high-intensity exercise (HIE), which has many health benefits including weight loss and increased cardiovascular fitness. However, when performed close to bedtime, it may reduce rapid eye movement (REM) sleep. Adequate sleep architecture may be more beneficial for the health of middle-aged adults, due to increased risk of disease with aging, rather than delaying or disrupting sleep to engage in exercise. Hence, the aim of this study was to investigate the effect of exercise time-of-day in middle-aged men on sleep architecture. 11 inactive men (age: 49±4.6y) completed 3 exercise trials of high-intensity interval cycling in a randomised order (60s at 100% VO₂peak; 240s at 50% VO₂peak) in the morning (MORN; 0600-0700h), afternoon (AFT; 1400-1600h), and evening (EVEN; 1900-2000h). Participants were screened for sleep disorders using questionnaires and 2 nights type 2 polysomnography (PSG). The sleep studies were further used to determine baseline sleep parameters. Participants' sleep was monitored using PSG the night following each exercise trial and scored for time in bed, total sleep time, sleep efficiency, sleep onset latency, REM onset latency, wake after sleep onset, and sleep stages (N1, N2, N3, and REM) for the whole night and initial 3h after sleep onset. Percent N3 sleep was greater following MORN (22.9±7.3%) compared to baseline (18.0±7.2%; p=0.02) with no other sleep-related differences. For the Initial 3h of sleep, percent of NREM sleep (92.4±5.1%) was greater and REM sleep (7.7±5.1%) was reduced following EVEN compared to baseline (87.3±5.4%; p=0.01). Sleep quantity does not appear to be influenced by HIE regardless of exercise time-of-day. However, when HIE is performed close to bedtime, sleep quality is reduced in the initial 3h, as indicated by decreased time spent in REM sleep.

Who is it good for?: Examining the relationship between reflective practice and mindfulness for promoting healthy lifestyles

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Reflective practice (RP) has received a wealth of support from numerous disciplines in the professional practice literature. Yet, resistance still remains for its use by practitioners beyond compulsory training. Reasons for this include a lack of empirical evidence that supports the effectiveness of RP and the potential benefits it affords practitioners and end users. The study aimed to generate empirical evidence of the benefits of RP for health-seeking clients. 150 participants (mean age: 17.7 years; BMI: 44.2 kg/m²) were assigned to one of three intervention groups: (1) generic health and fitness; (2) generic health and fitness plus mindfulness training; and (3) generic health and fitness plus mindfulness and RP training. Outcome measures included body composition and cardiorespiratory fitness, which were collected at baseline and post-intervention. Process measures assessed mindfulness and reflection skills and were collected four times during the intervention process.

Interaction effects were noted for mindfulness and reflection skills indicating divergent trends between treatment groups F(6, 242)=5.3, p<0.05. Post-hoc analysis indicated no differences between Group 2 and Group 3, whilst scores for Group 1 were lower than Group 2 and Group 3. Both body composition and cardiorespiratory fitness, improved from pre- to post-intervention for each group, with Group 3 achieving better improvements than the other groups for waist-to-height ratio F(2, 123)=10.8, p<0.01, and body fat percentage F(2, 123)=49.2, p<0.01. The mindfulness and RP interventions appeared beneficial in terms of helping participants to improve their related skills which facilitated the adoption of healthier lifestyles. In line with calls from the literature the study adopted an experimental design to generate empirical evidence regarding the benefits of RP for health-seeking clients and adds to the already extensive purported benefits for practitioners and end users alike.
Adolescent and Young Adult Life Now Group Exercise Program: Function vs Feelings (Interim results)

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Introduction & Aim: The role of supervised exercise as an effective adjunct therapy to address chronic physiological and psychological effects experienced by cancer survivors is established in the literature. Currently the majority of research has focused on adult or paediatric populations with little focus on the unique cohort of adolescent and young adult (AYA 15-25 years) patients. Given the probability of decades of post-treatment life expectancy for AYA cancer survivors, it is important to promote behaviours that enhance physical and mental wellbeing and quality of life. Recent reports have identified that only 50% of AYA cancer survivors meet recommended daily physical activity guidelines. The aim of this trial was to determine if an individualised supervised group exercise program delivered for AYA cancer survivors would lead to positive benefits on the physical and psychosocial functioning of this cohort.

Methods: Twenty six AYA cancer survivors have completed the 12 week community based exercise program. The bi-weekly combined resistance and cardiovascular exercise program was supervised by an Accredited Exercise Physiologist. Rigorous pre and post intervention assessments investigated variables including Vo2 peak, 1RM strength measures, functional tests, body composition and psychosocial evaluations.

Results & Conclusion: Preliminary data demonstrated significant improvements in all strength and functional variables (1RM chest press, 1RM leg press, 1RM seated row, 30s push ups, sit ups, sit to stands, grip strength P<0.05). Trending improvements were evident in lean muscle mass (p=0.06) and increase in bone mineral density (p=0.08), and a significant reduction in fat mass (P=0.007). Of particular interest was the qualitative feedback pertaining to participants’ shared experience within a group based setting and the positive impact it had on their lives. Final data aggregation will be completed in December 2017.

Potential impact of exercise on treatment related toxicities in AYA cancer patients; a case control pilot

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The role of exercise in adolescents and young adult (AYA) cancer patients is largely understudied comparative to paediatric and adult cohorts. Despite advances in cancer treatments and ever improving survival rates, treatment-related toxicities continue to significantly impact physical and mental wellbeing often well into survivorship. Given the decades of life AYA patients are expected to live following completion of treatment for cancer, the lasting effects of treatment-related toxicities can be a significant burden on both the patient and the healthcare system. Over the last decade exercise as an adjunct therapy in cancer care has been well established. Improvements have been demonstrated in physical functioning, body composition, fatigue, psychological distress and quality of life. However, to date, there is a paucity of research in the impact of exercise on treatment-related toxicities. This retrospective case control study will be the first of its kind to investigate the potential role exercise may play in mitigating the side effects of cancer treatment, reducing the impact of treatment-related toxicities in AYA patients. This study will identify patients from the Western Australian Youth Cancer Service (YCS). A sample of five patients who completed regular documented exercise with the YCS Accredited Exercise Physiologist will be matched for age, sex, diagnosis and treatment regimen to five patients who did not complete any formal exercise during treatment. The retrospective audit will record and evaluate treatment-related toxicities (using the Common Terminology Criteria for Adverse Events V 4.03) and planned chemotherapy dosage completion in the matched pairs. This will aim to identify the impact of exercise on treatment-related toxicities and chemotherapy completion rates between groups. It is expected that results from this study will then inform data collection in a prospective RCT in this cohort.
Monitoring Quality of Life in prostate cancer patients: a clinical outcome in the cancer continuum recovery

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Introduction: Monitoring Quality of Life (QoL) after cancer diagnosis could increase the efficacy of rehabilitation programmes, to improve the quality of survival, and to improve the multidimensional spectrum of QoL in the cancer continuum.

Understanding the real dynamic of QoL over time would help to adapt rehabilitation programmes by improving sensitivity and efficacy and provide professionals with a more accurate perception of the impact of treatment and side effects on patients’ QoL.

Aim: To obtain a valid and sensitive assessment of QoL change over the cancer continuum, and to evaluate a rehabilitation programme aimed at inverting the observed decrease in QoL when patients return to daily living activities.

Methods: Sample comprised 66 men. Patients were assessed at diagnosis to establish a baseline. This was followed by a post-test at discharge. A retrospective evaluation measurement of diagnosis moment was also carried out after discharge (then-test). Patients were randomized in experimental and control groups. The experimental group attended an Exercise Rehabilitation Programme (ERP) over 24 weeks.

Results: From baseline to post-test QoL decreased significantly. Then-test confirmed a low QoL in all periods evaluated. Significant differences between the experimental and control groups prove the positive effect of the ERP on QoL. Results underline the importance of changing health professionals approach towards a proactive watchful waiting on patients’ QoL until complete recovery. Also, the efficacy of ERP has been demonstrated as primary treatment for QoL. These results are a useful bridge from research knowledge to clinical practice and help to make valid decisions in the multidimensional cancer continuum recovery.

Conclusion: This proposal is a relevant strategy to engage professionals into a proactive approach in QoL from cancer diagnosis to adjust timing and enhance efficacy of rehabilitation programmes and improve the overall QoL in the cancer continuum.

Examining the Trendelenburg Test: A Correlation Study on Individuals with Non-Specific Low Back Pain and Controls

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Introduction: The Trendelenburg test (TT) is a clinical test purported to examine the ability of the hip abductor muscles (HABD) to maintain a horizontal pelvic position during single limb stance. It is used as a functional measure of hip abductor muscle (HABD) strength and lumbopelvic stability. The underlying mechanical basis of the test performance outcome has not been fully investigated and no study has specifically tested this theory.

Aim: To examine the relationship between HABD strength and contralateral pelvic drop (cPD) measured during the TT in individuals with non-specific low back pain (NSLBP) and in controls. To determine if a positive TT outcome is associated with a threshold value of normalised HABD strength.

Methods: A cross-sectional correlational study. Eighty-two controls (CON) (28 years ± 9) and eighty NSLBP patients (38 years ± 12; VAS 5.0 ± 1.5 cm) were recruited. Isometric HABD strength was measured using a force dynamometer using ‘make-test’ methods. Two-dimensional cPD (degrees) was measured using a 60 Hz camera and derived from two retroreflective-markers placed on the posterior superior iliac spines. Video recordings were digitized and coordinates were used to calculate the average peak angles of cPD during the TT.

Results: Only a small number of positive TTs occurred within both groups CON (9%) and NSLBP (13%). Weak negative correlations were found between HABD strength and cPD measured during the TT for both the CON (R: r = -0.09, L: r = -0.2) and the NSLBP (R: r = 0.15; L: r = -0.06) groups respectively.

Conclusion: The HABD muscles are not primarily responsible for maintaining pelvic position during the TT. Pelvic position during the TT may also reflect the differences in individual positional strategies and the reliance on other muscle groups. The sole use of the TT as a screening measure of HABD muscle function or to assess the pelvic stability should be discouraged.
The Acute Effect of a Single Yoga Lesson on Mood and Stress among College Students

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Purpose: Yoga is an exercise mode that has gained popularity across the world over the years due to its physical and mental benefits (e.g., flexibility, relaxation, calmness). This study examined the acute effect of one yoga lesson on college students’ mood (both positive mood and negative mood) and cortisol level.

Methods: The study took place in a prestigious university in Beijing, China. The sample consisted of 192 students (Mean age = 19.76) enrolled in two types of physical activity courses: yoga class (n = 98) or health-related fitness class (control group: n = 94). The Chinese version of the Positive and Negative Affect Schedule Scale (PANAS; Watson, Clark, & Tellegen, 1988) was used to measure positive and negative mood. Saliva was collected to determine cortisol level which measures stress. The two measures were administered to students in both groups before and then after taking the physical activity classes. Multivariate analysis of variance was conducted to determine the time, group, and time x group interaction effects for mood and stress.

Results: The results demonstrated that students in both groups showed increase in positive mood and decrease in negative mood as a result of taking the respective physical activity lessons. However, compared to those in the fitness group, students in the yoga group showed significantly greater increase in mindfulness (yoga group: ΔM = .64; fitness group: ΔM = .31; F₁,190 = 4.08, p < .05) and greater decrease in stress (yoga group: ΔM = -.70; fitness group: ΔM = -.35; F₁,190 = 5.96, p = .02).

Conclusion: This study confirmed the positive effect of physical activity classes on mood and stress. Furthermore, compared to the fitness lesson, the yoga lesson demonstrated greater effect on mindfulness and stress. This set of findings are meaningful to college students’ mental health. Taking one single physical activity lesson, especially yoga, can help students be mindful of behaviors and manage stress.

Footwear Asymmetry in novice women runners: A feasibility study

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Background: Asymmetric footwear may be a result of design and/or degradation and has been linked to decreased balance and dynamic task performance. Monitoring footwear using the Total Asymmetry Score (TAS) tool could provide insight into the development of running-related injury.

Aim: To investigate the feasibility of monitoring footwear asymmetry and overuse injuries in novice runners.

Methods: Footwear asymmetry and comfort were recorded in twenty-seven women runners every three weeks of a standardised 12-week half-marathon training program. An online questionnaire recorded weekly pain locations and severity scores of overuse problems. Feasibility was assessed based on participant retention rate of 80%, training program adherence of 90% and overall participant satisfaction of 75%.

Results: Fifteen participants finished the training program and half-marathon, indicating a retention rate of only 56%. Of the 15 finishers, adherence and study satisfaction ranged from 80-99%. TAS scores were higher for participants who reported pain (range 0 to 6 mm). Comfort scores were lower for those who completed the race (range: 71-79). A total of 171 overuse problems were reported (mean severity 6.0 ±7.7).

Conclusion: Our results suggest monitoring footwear asymmetry in novice women runners is feasible. Future studies should consider a drop-out rate of approximately 44%.
Functional Outcomes for a Traumatic Lower Limb Amputee Following a Multi-Disciplinary Rehabilitation Program; a Case Study

Kerri Ireland

**Introduction:** An important goal of the amputee rehabilitation process is the ability to walk. Walking with a prosthesis requires a higher level of aerobic conditioning and muscular endurance than walking with two sound legs. Exercise programs focusing on aerobic endurance and muscular strength have shown to improve deconditioning and achieve functional outcomes.

**Situation:** John (name changed) is a 57 year old male who underwent a left below knee amputation in July 2017 following a workplace injury. John was referred to the Day Rehabilitation Service for amputee rehabilitation and prosthetic fitting.

**Methods:** John attended 3 EP sessions per week for 8 weeks. The exercise program was divided into pre-prosthetic and post-prosthetic stages. Pre-prosthetic intervention included aerobic capacity and strength exercises mostly on the sound leg, progressing to strength exercises on the prosthetic side during the post-prosthetic phase.

**Results:** John achieved a score of 46 out of 47 on the AMPPRO test, classifying as a level K4 on a 0-4 scale. He also achieved unaided walking and standing with a prosthesis, 350 metres in the six minute walk test, 1.15m/s in the self-selected gait speed test, 9.2s in the 3 metre TUG test, and 9 unaided chair stands in 30 seconds.

**Discussion:** This case study demonstrates excellent outcomes for a client who underwent multi-disciplinary rehabilitation post traumatic below knee amputation. Pre-admission, the client’s goals were to be able to walk independently, increase walking endurance, and return to work. Following the multidisciplinary rehabilitation program John was able to achieve all goals within an 8 week period.

**References:**

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The OPTIMA-Ex trial: bone response to impact versus resistance training in young adult women – protocol and preliminary results of a randomized-controlled trial intervention

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**Introduction and Aims:** The OPTIMA-Ex (Osteoporosis Prevention Through Impact and Muscle-loading Approaches to Exercise) trial aims to compare bone responses to two known osteogenic stimuli – impact exercise and resistance training in young women at risk of fracture in later life. Determining the most effective source of loading would provide grounds for optimal prescription for osteogenic exercise strategies for young adult women.

**Methods:** The trial is a three-arm, single-blind, single centre randomised controlled exercise intervention trial targeting sedentary women aged 18-30 years with lower than average bone mass (T-scores<0). 174 participants will be randomized to 10 months, twice-weekly, either supervised high intensity impact training (IT), high intensity resistance training (RT) or home-based low intensity exercise (active control) (CON). Lumbar spine (LS), femoral neck (FN) and whole body bone mineral density (BMD) from DXA (Medix DR), geometric indices of bone strength from pQCT (XCT-3000) and 3D Hip analysis (DMS Group); lean and fat mass; indices of physical performance; safety and acceptability of exercise are measured at baseline and follow-up. Preliminary BMD outcomes have been examined per-protocol using repeated-measures ANCOVA adjusted for compliance, age, height, weight, total lifetime physical activity, dietary calcium and baseline values.

**Results:** To date, a total of 35 healthy young women (age=22.1±3.5 years; height=1.64±0.62m; weight=57.7±8.4kg) have been randomised (IT=11, RT=12, CON=12) with no between-group differences for baseline characteristics. Follow-up data is available for 14 participants (IT=5, RT=5, CON=4) and demonstrates no between-group differences for LS BMD (p=0.201–0.491) or FN BMD (p=0.456–0.827), but a trend toward within-group differences for the RT group for LS BMD (p=0.078) and FN BMD (p=0.056). There have been no injuries.

**Conclusion:** The trial is ongoing. Additional data is required to achieve adequate statistical power.
Foam rolling is an effective self-therapy for the purported purpose of reducing muscle tightness. We conducted a systematic review to determine whether using a foam roll for self-treatment of the posterior thigh increased hamstring flexibility. We searched electronic databases of the Cochrane Library, PubMed, EBSCO Host, and Wiley Online Library for randomised controlled trials and cohort studies in which foam rolling was applied to the hamstring muscles of uninjured or injured participants. We included studies published in English, and excluded duplicate reports, studies published in other languages, and review articles. We identified six studies for inclusion in this review. Only three of these studies reported data sufficiently for extraction and re-analysis. The other three studies were included for descriptive reporting. Continuous data reporting hamstring range of movement in control and intervention groups were extracted as means and standard deviations. In only one of the three meta-analysed studies was the effect of foam rolling clearly favourable over a non-intervention control. This study was small (n=13/group), and was weighted accordingly (27.8%) in the meta-analysis. Because of variation in trial design and outcome measures, we used a standardised mean difference (SMD) analysis to calculate effect size and applied a random effects model. SMD between foam rolling and a non-intervention control on hamstring flexibility was estimated at 0.38 (95% CI -0.34, 1.10). The effect of foam rolling on hamstring flexibility appears small and not consistently greater than a non-intervention control. At this stage, we cannot recommend foam rolling as a clinical tool; there is insufficient evidence that foam rolling is an effective self-treatment to increase hamstring flexibility. Because current studies are variable in design and quality, further high-quality studies may change our estimate of effect size and allow us to be more confident in our estimate.

Foam rolling for hamstring flexibility: A systematic review

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The effects of physical activity on beliefs associated with adherence and pain-related disability in people with chronic low back pain

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Exercise is the first step recommendation for chronic low back pain (CLBP). However, an optimal modality is unknown. A biopsychosocial approach to physical activity (PA) for CLBP must understand the effects on beliefs associated with both adherence and pain-related disability. An RCT and cross-sectional study were undertaken to address these gaps in the literature. The RCT observed differences in beliefs and clinical outcomes of an 8-week individualised (IEP) and general exercise program (GEP). Data were collected after the initial session and at 8-weeks, to observe beliefs associated with adherence. Self-efficacy, outcome expectation, and intention were measured based on the pathways of Social Cognitive Theory. No difference in beliefs were observed between-groups at both intervals. Clinically meaningful indicators (CMI) were measured as ≥10-point reduction for disability (ODI) and ≥30% for pain (VAS). The IEP recorded 31% and 46% of participants showing CMI for ODI and VAS respectively, while the GEP reported 53% and 47%. Thus, this study suggests both modalities are feasible for reductions in pain-related disability, and manipulating beliefs associated with adherence. The cross-sectional study (n=118) observed the effect of PA on psychosocial variables such as fear avoidance (FA), and functional self-efficacy (FSE). This study observed if any psychosocial variables explained the relationship between pain and disability in CLBP patients who were (n=59) and were not (n=59) engaging with PA. The results of this study showed FA and FSE explained pain-related disability for all participants. Moreover, it appears the role of FSE may be increased in CLBP patients engaging with PA, regardless of modality. This research shows the positive impact of PA on beliefs and clinical outcomes, regardless of modality. Pragmatically, general programs may be used to begin the client exercising sooner leading to confident prescription and adherence of unsupervised activity.
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Does the use of an activity tracker support older adults to maintain activity levels following a lifestyle intervention?

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Introduction: Regular participation in planned exercise assists in managing the effects of ageing, however 49.7% of Australian adults over 65 years do no exercise. Lifestyle interventions are effective at increasing exercise levels but effects decrease following the intervention. While telephone counselling has proved effective for providing ongoing support, it can be time consuming. Wearable activity trackers and associated mobile applications are widely available and provide users with real-time data, tracking and motivational tools. The current study aimed to determine if the use of telephone counselling or activity trackers could assist older adults to maintain activity levels following an exercise intervention.

Method: 150 participants from the Strength2Strength (S2S) exercise intervention were recruited to participate in a 12 month follow-up study. 50 participants were randomised to each group; Telephone counselling (TC), Activity Tracker (AT) and Usual Care (UC). The primary outcome measure was daily steps. Outcome measures were obtained post S2S and at 3, 6 and 12 months.

Results: 99 participants completed 12-month follow-up (UC; n=37, TC; n=31, AT; n=31). There were no significant between group changes during the 12 month follow up period. Participants in the AT group showed the greatest increase in steps at 3 months (mean change; AT: +652, TC: +81, UC: +133). All groups showed a decrease in steps between 6 and 12 months (AT: -921, UC: -867, TC: -268 steps). The TC group showed the least overall decrease in steps from baseline (-69) with the UC group showing the greatest decrease from baseline (-653).

Conclusion: The use of an activity tracker may support individuals to maintain activity levels following a lifestyle intervention. The effect however diminishes over time, suggesting a novel effect. In comparison, those receiving telephone counselling were more likely to maintain consistent activity levels over the 12 month intervention period.

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Recommendations for the design and delivery of physical activity interventions for children and youth with disabilities: New frontiers

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Introduction and aims: Children with disabilities spend 76% to 99% of their waking hours in sedentary activity. Exercise interventions alone are ineffective at improving and sustaining physical activity levels in this population. This research aimed to provide evidence of operative strategies to enhance the design and effectiveness of interventions, to optimise physical activity participation outcomes for children with disabilities.

Methods: A qualitative design using the Medical Research Council’s complex intervention framework was employed. Participant recruitment occurred through purposive and theoretical sampling of children with disabilities (n=31, mean age 12y 6m (SD 2y 2m); 18 males), parents (n=44), and paediatric service providers (n=20) involved the Local Environment Model intervention at the internationally renowned Beistostolen Healthsports Centre in Norway. Triangulation of semi-structured interviews and overt observational methods explored the active ingredients and outcomes of the intervention, and determined relationships between participant viewpoints and behaviours. Data synthesis were an iterative approach of constant comparison and open, axial and selective coding analysis.

Results: The inter-related findings between participant groups described intervention mechanisms that promoted physical activity participation outcomes for children with disabilities. Thematic analysis revealed three overarching themes detailing how the intervention elicits and sustains outcomes, including: (i) support and relationships, (ii) a participation-focused approach, and (iii) investing in the future. Recommendations for clinical practice comprised guidelines for goal-directed, family-centred interventions, geographically organised groups, and community partnerships.
Conclusion: These findings add new knowledge to key stages of intervention development that should be applied by exercise physiologists attempting to optimise outcomes for children with disabilities.
A phase II trial evaluating exercise for patients with brain cancer. The BRAin Cancer and Exercise (BRACE) study protocol

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Introduction & aims Brain cancer is associated with poor prognosis, high disease burden and significant side effects affecting physical cognitive and emotional function. While exercise improves side effects, function and quality of life for those with other cancers, the safety and feasibility of exercise post-brain cancer is yet to be established.

Methods BRACE is a one-arm clinical trial that will evaluate the feasibility and safety of exercise in those with primary brain cancer (n=30). Adults, 12-16 weeks post-radiotherapy with Eastern Cooperative Oncology Group status 0-2, and anticipated survival of at least 12 months are eligible for participation. The 18-week intervention involves participating in an individualised prescription of aerobic and resistance-based exercise at moderate-intensity, accumulating ≥150minutes per week. Participants are assessed at baseline, 9-weeks, 18-weeks and 6-month follow up. Primary outcomes include 1) feasibility: retention, adherence and compliance rates; deemed acceptable when ≥75%; 2) safety: intervention will be considered safe if CTC-adverse events of grade 3-5 are less than 10%. Secondary outcomes include changes in quality of life (FACTBr+4), fatigue (FACIT-F), function (6-minute walk test, balance, strength), mood (HADS) and activity (Godin leisure time). Secondary outcomes will be tracked over time and analysed using repeated measures regression. We will explore trajectories of outcomes and categorise participants accordingly (improvers, no change, decliners) and will explore the relationship between outcomes and diagnosis and treatment characteristics and intervention compliance.

Ethics & dissemination The protocol has been approved by the Human Research Ethics Committee at Bellberry Limited (approval number 2017-06-481) and Queensland University of Technology (1700001009). Results will be disseminated via peer-reviewed journal articles and presentations at scientific meetings. Trial registration request number 373967.

Are Australian fitness industry professionals interested in engaging with high health-risk populations?

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Introduction: Fitness industry professionals (personal trainers, group instructors) may have a role in community health promotion, particularly when working with sub-groups with known health-risks (e.g. older adults, obese). The aim of this study is to examine fitness professionals’ level of interest in engaging with high-risk populations and how it varies across sociodemographic and fitness industry-related factors.

Methods: In 2014, fitness industry professionals completed an online survey. Respondents reported their level of interest in engaging with four different high-risk-population sub-groups (e.g. Adults (18-59yrs) with health conditions, currently overweight clients). A multinomial logistic regression analysis was used to examine sociodemographic and fitness industry-related factors associated with level of interest in engaging with high-risk populations.

Results: Of 1,185 respondents (aged 17-72 years), 23.3% (95% CI: 20.8%-25.8%), 45.7% (95% CI: 42.8%-48.6%) and 31.1% (95% CI: 28.5%-33.7%) reported having a low, moderate and high-level of interests in training high health-risk sub-groups, respectively. In the multivariable analysis, male (OR: 1.55; 95% CI: 1.06-2.25) and those in urban settings (OR: 2.26; 95% CI: 1.54-3.37) were more likely to have a low-level of interest in training high-health risk clients, after adjusting for a set of confounders.
Conclusions: Among a large sample of Australian fitness professionals, ~70% reported a low-to-moderate level of interest in training high health-risk sub-groups. To enable fitness industry professionals to work with those who theoretically most need their services, future health promotion policies should aim to increase fitness professionals’ engagement with high health-risk populations.
A comparison of resistance training exercise strategies to reduce fracture risk in older men with osteopenia and osteoporosis: The LIFTMOR-M protocol and preliminary functional findings

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Introduction & Aims: The optimal exercise prescription for the management and prevention of osteoporosis in men has been elusive. The LIFTMOR-M (Lifting Intervention For Training Muscle and Osteoporosis Rehabilitation for Men) trial will compare the effects of two novel bone-targeted exercise programs on parameters of bone strength and functional risk factors for falls and fracture in older men with osteopenia and osteoporosis.

Methods: 128 men ≥ 50 years of age with low bone mass (T-score ≤ -1.0) and no conditions or medications known to adversely affect bone are currently being recruited. Eligible participants are randomly assigned to 8-months of high-load progressive resistance training plus impact loading (HiRIT) or bioDensity machine-based isometric exercise. Twice-weekly, 30-min, supervised training sessions are performed. Testing at baseline and follow-up includes anthropometry, whole body and regional parameters of bone strength, body composition, thoracic kyphosis, and functional measures (back extensor strength [BES], lower extremity strength [LES], timed-up-and-go [TUG], functional reach [FRT], and sit-to-stand [STS]). Per-protocol analyses of preliminary functional outcomes have been conducted using repeated measures ANOVA.

Results: To date, 47 men (66.3±7.4 yrs; 82.0±11.7 kg; 175.6±6.8 cm) with low bone mass (femoral neck T-score -1.70±0.60) have been recruited and assigned to HiRIT (n=25) or bioDensity (n=22) training. Twenty-five (13 HiRIT, 12 bioDensity) have completed the intervention. A number of modest functional improvements have been observed, including in BES (38.4±46.4% vs 15.8±30.5%), LES (34.0±31.4% vs 24.3±29.5%), TUG (5.5±7.1% vs 0.7±6.6%), FRT (2.6±11.9% vs 0.1±9.8%), and STS (9.0±9.2% vs 3.3±9.6%) but none have yet reached statistical significance.

Conclusion: Findings of the LIFTMOR-M trial will facilitate the development of an optimal exercise program for men with low bone mass at risk of low-trauma fracture. Data collection is ongoing.
The effect of high intensity interval training versus moderate intensity aerobic training on arterial stiffness and 24 hr blood pressure: A systematic review and meta-analysis

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Introduction: Cardiovascular disease (CVD) is the leading cause of mortality worldwide. Arterial stiffness (AS) and 24 hr blood pressure (24 BP) are strongly associated with cardiovascular mortality and events, and aerobic exercise has been shown to be beneficial for improving these. Although current exercise guidelines focus on regular moderate intensity continuous training (MICT) for managing cardiovascular health, recent research suggests that high intensity interval training (HIIT) may reduce (improve) AS and blood pressure.

Aims: To compare the effect of HIIT versus MICT on AS and 24 BP outcomes via systematic review and meta-analyses of the collective data from available studies.

Methods: Database searches were performed in AMED, MEDLINE, SPORTDiscus, CINAHL, EMBASE and Web of Science Core Collections. Eligible trials included exercise interventions that compared HIIT and MICT, and reported measurements of AS or 24 BP.

Results: Nineteen eligible trials involving acute (n=8) or chronic (n=11) exercise in predominately healthy (n=11) or cardiometabolic disease populations (n=8) were identified. When combined, 673 (19-68 yrs; BMI: 22-40 kg/m^2; 64% males) individuals completed the trials. The majority of HIIT interventions involved repeated high intensity bouts at 75-95% HRmax for 1-4 mins, or “all out” sprint efforts for 30s, and MICT interventions conformed to current exercise recommendations. Seventeen studies were included for meta-analyses: 13 studies reported AS outcomes and 4 studies reported 24 BP. There was a near-significant pooled ES in favour of HIIT on AS, as measured via augmentation index (ES=-0.287; 95% CI:-0.585 to 0.010; P=0.058). There was no significant difference between HIIT and MICT for all other indices including 24 BP (P>0.05 for all).

Conclusion: HIIT may be superior to MICT for improving arterial stiffness, however no significant difference was found for other measures including 24 BP outcomes.
How the Kaizen Model helped determine the health and wellbeing profiles of a predominately male workforce, and reduce overall risk within a large mining services company in Perth, WA

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A Kaizen has many components and is a Japanese term for continuous improvement. The aim of a Kaizen is to make the business model better. We were challenged to apply the Kaizen model to improve the health profile of the workforce. The Kaizen had never been applied to humans in the long history of this multinational. Find out how we created an Australian first.

Kaizen is a philosophy and practice that sees improvement in productivity as a gradual and methodical process. It represents change for the better - on a regular basis. A Kaizen ensures employee satisfaction, making the job more fulfilling, less tiring and safer. Safety is a keystone of this company yet they have a workforce at great risk. How?

The format of the traditional Kaizen model is PDCA.

Plan - what to expect
Do – best solution implemented
Check- evaluate the solution to the problem
Act - make it a standard or change further

We will demonstrate how we applied these four key components of the PDCA model to create a unique approach, work with workforce and present health and wellbeing data that satisfies the Kaizen and reduces the risk profile of the company.

We had to identify the one health factor that would drive the improvement. This factor had to fit one of the key objectives of a Kaizen – “eliminating waste”. When subjected to small change, over a period, this factor will create an absolute improvement within the company. We created a competition and metric to track this impact.

Building a relationship with a company and its workforce, using a Kaizen Model, challenges our current management practices and approaches when we manage the health, wellbeing and performance of the any workforce.

We will demonstrate how this alternative delivery model is particularly relevant for those of us in the business of creating elite workforces and improving their health and performance profiles.

These small changes - if made now - can have a huge impact on our future.

Examining relationships between child physical activity levels, child self-perceptions and parental physical activity support

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Introduction: Previous research has demonstrated that children’s physical activity (PA) levels are declining, particularly in children who have physical, developmental, and/or behavioural barriers to PA. Given the important role parents may play in the examination of the effects of parental PA support on children’s self-perceptions and PA is warranted.

Methods: 117 children (74 male and 46 females), with a mean age 8.8 ±1.9 years, were recruited from the community. Children’s movement proficiency was evaluated using the Movement Assessment Battery for Children–2. PA levels were measured using Actigraph GT3x accelerometers worn on the hip for a minimum of 5 days. The Children’s Self Perceptions of Adequacy in and Predilection for PA questionnaire was administered to determine children’s perceptions of their adequacy in performing PA, likelihood of selecting (predilection) PA, and enjoyment of PA. Children’s perceptions of parental PA support were measured using the Activity Support Scale for Multiple Groups. Mediation analysis was performed to explore relationships between perceptions of parents’ logistic support (independent variable), children’s physical activity-related adequacy, enjoyment, and predilection (mediators), and PA (dependent variable). Children’s gender and movement proficiency were considered as covariates.

Results/Conclusion: Results indicated that perceptions of greater parent logistical support for PA predicted stronger perceptions of adequacy (i.e., confidence) toward PA participation among children, which, in turn, predicted greater PA levels. Results of the prediction model are currently being used to inform a parent-focused behaviour change feasibility trial to be carried out in a community based PA program.
Screen time use among children and adolescence: methodology for a scoping review and preliminary findings

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Introduction: Time-use in television viewing and computer use among young people has been extensively reported over the last several decades. The availability of different types of screen-based devices (e.g. tablets, smartphones, gaming consoles) has increased considerably in recent years. However, there is limited understanding on the time-use of these newer screen-based devices among young people.

Objective: To conduct a scoping review to examine the literature on screen time-use in young people (5-18 years).

Methods: A scoping review to systematically search eight online databases for population-based studies. Inclusion criteria are: (i) population-based studies (minimum sample size n=5000); (ii) participants aged 5-18 years; (iii) studies reporting time-use data on at least seven screen devices; and (iv) studies analysing data collected since 2000. Screening and data extraction was conducted in duplicate.

Preliminary findings: After screening 363 full-text articles, a total of 121 studies were included in the review. Most studies were conducted in USA (n=40), Europe (n=32), and Canada (n=16). Sample sizes ranged from 5003 to 2,848,480 participants. Of 121 included studies, the majority (68%) reported screen-time prevalence on a variety of screen-time behaviours. Television (TV) viewing (64%) was the most common measure of screen-time whilst time-use in newer screen-based devices, such as smartphones (5%), active gaming consoles (1%), and tablets (1%), received much less scholarly attention.

Discussion: This scoping review addresses a gap in evidence by systematically reviewing public health surveillance literature to describe the current time-use trends in traditional (TV, computer) and newer screen-based devices (e.g. tablets, smartphones) among children and adolescents. Findings may be used to inform future research and policy designed to identify the time-use of newer screen-based devices and limit overall screen-time among young people.

The Benefits of a Short-term Aquatic Exercise Programme for Individuals with Chronic Fatigue Syndrome/Myalgic Encephalomyelitis

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Introduction and Aims: Aquatic exercise is recommended for patients with fibromyalgia, arthritis and multiple sclerosis but has rarely been used with Chronic Fatigue Syndrome/Myalgic Encephalomyelitis (CFS/ME). This pilot study investigated the effects of a short-term aquatic exercise programme on symptoms, physiological outcomes and exercise capacity in women with CFS/ME.

Methods: Eleven women (54.8 ± 12.4 yr) volunteered for the five-week program, comprising an initial 20-minute aquatic exercise session then two self-paced 20-minute sessions per week for four weeks. Sessions included aerobic, strength and flexibility exercises. Pre- and post-intervention outcomes were physiological measures, 6 Minute Walk Test (6MWT), perceived exertion (RPE), hand grip strength, Sit-Reach test, Apley’s shoulder test, Sit-to-Stand, FACIT fatigue questionnaire, and 24-h post-test tiredness and pain scores (0-10 VAS). Heart rates, RPE, 24- and 48-h post-session tiredness and pain scores were recorded for each session.

Results: There were significant improvements in 6MWT distance (60.9 m, p=0.006), left hand grip strength (6.0 kg, p=0.038), right shoulder flexibility (2.9 cm, p=0.026), Sit-Reach test (4.0 cm, p=0.017), FACIT scores (8.2 points, p=0.041), and 24-h post-test tiredness (1.5 points, p=0.002) and pain (1.6 points, p=0.002). Exercising heart rates at the 6MWT 4- and 6-min timepoints and oxygen saturation at 2-min increased post-study while RPE at 4-min decreased (p<0.05). Exercise session RPE and post-exercise tiredness also decreased (p<0.05). There were no reports of symptom exacerbation.

Conclusions: Five weeks of self-paced aquatic exercise significantly improved exercise capacity, RPE, fatigue and post-exertional malaise (PEM). Cardiopulmonary adaptations, and neural / hypertrophic mechanism are enhanced by overcoming buoyancy, resistance and drag without worsening symptoms. Aquatic exercise may be safe and effective for clinical rehabilitation of CFS/ME patients.
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Oral folic acid supplementation improves vascular endothelial function, but not skin blood flow during exercise, in patients with heart failure

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Introduction & Aims: Heart failure (HF) patients' are limited in their ability to manage a thermal load during exercise secondary to impaired skin blood flow (SkBF). Folic acid has been shown to improve vascular function and accompanying changes in SkBF in healthy older individuals and in those with chronic disease. Therefore, we examined the effect of folic acid on vascular function, and SkBF during exercise in 10 HF patients and 10 controls (CON) during exercise at a fixed metabolic heat production (Hprod).

Methods: Rectal temperature (Tre) and cutaneous vascular conductance (CVC) were measured during 60min of cycle ergometry before (pre) and after (post) a 6 week intervention period where participants ingested 5mg of folic acid, once daily. At these time points, vascular function was assessed using flow-mediated dilation (FMD).

Results: Hprod was maintained at the same level for HF (pre: 332±46; post: 337±51,W, p=0.84) and CON (pre: 323±31; post: 317±40,W, p=0.72), and no differences were observed between groups in both exercise trials (p>0.05). Tre increased to a similar extent for HF (pre: 0.76±0.22°C; post: 0.70±0.11°C, p=0.63) and CON (pre: 0.55±0.27; post: 0.45±0.25°C, p=0.84); however, the rise in Tre was consistently higher in HF during both exercise trials (p<0.05). Similarly, CVC increased to a similar extent for HF (pre: 0.89±0.43; post: 0.83±0.45au/mmHg, p=0.80) and CON (pre: 2.01±0.79; post: 2.03±0.72au/mmHg, p=0.73), but the rise in CVC was consistently lower in HF during both exercise trials (p<0.05). Furthermore, folic acid improved FMD in HF (pre: 3.72±1.16; post: 5.88±1.29, p<0.01); however, no difference was observed in CON (pre: 5.47±1.98; post: 6.50±2.49%, p=0.20).

Conclusion: Collectively, folic acid supplementation does not serve to enhance SkBF responses and attenuate the rise in core temperature during exercise at a fixed Hprod in HF patients. However, folic acid improved vascular function to a greater extent in HF than CON.

Short-duration high-intensity exercise activates haemostasis regardless of time of day

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Introduction & Aims: Exercise has been shown to have considerable effects upon haemostasis, with activation dependent upon the duration and intensity of the exercise bout. In addition, markers of coagulation and fibrinolysis have been shown to possess diurnal variations, peaking in the morning (0600-1200 h). Therefore, the time of day exercise is performed may influence the activation of the haemostatic system. This study aimed to investigate, 1) acute changes in haemostatic activation following short-duration high-intensity exercise across the day in well-trained male cyclists, and 2) whether time of day affected pre-exercise markers of haemostasis.

Methods: Fifteen male cyclists (V02max: 60.3±8.1ml.kg-1.min-1) completed a 4km cycling time trial (TT) on five separate occasions at 0830, 1130, 1430, 1730 and 2030h. Trials were completed in a randomised order. Venous blood samples were obtained pre- and immediately post-exercise, and analysed for tissue factor (TF), tissue factor pathway inhibitor (TFPI), thrombin anti-thrombin complexes (TAT) and D-Dimer.

Results: Exercise significantly increased plasma concentrations of TF (p<0.0005), TFPI (p<0.0006), TAT complexes (p<0.0012) and D-Dimer (p<0.0003). There was a time of day response in pre-exercise TF (p=0.004) and TFPI (p=0.031), with 0830 greater than 1730 (p<0.001), while 1730 was less than 2030 h (p=0.008), respectively. There was no significant effect of time of day for TAT complexes (p=0.364) and D-Dimer (p=0.228). Power output, TT time and heart rate were not significantly different between TTs (p>0.05).
Conclusion: Regardless of the time of day, a short-duration high-intensity bout of exercise results in acute activation of both coagulation and fibrinolysis. Furthermore, a diurnal variation was present within the pre-exercise markers of TF and TFPI, but not within TAT and D-Dimer, suggesting an increase in hypercoagulability within the morning.

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Compression socks reduce exercise-associated haemostatic activation in marathon running

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Introduction & Aims: Compression socks are widely used within clinical settings for the prevention of lower extremity clinical pathologies. More recently, their use has widened through the sporting industry due to their proposed enhancement of exercise performance and recovery. The use of compression socks on haemostatic activation during endurance exercise however, has yet to be extensively investigated. Therefore, this study aimed to investigate the effect of compression socks on exercise-induced activation of coagulation and fibrinolysis following a marathon run.

Methods: Forty-three males (mean ± SD: age: 46.7±10.3 y) and 24 females (age: 40.0±11.0 y), were allocated to either a compression (SOCK; n=34) or a control (CONTROL: n=33) group to complete a 42.2 km marathon. Venous blood samples were obtained 24 h prior to, and immediately post-marathon, and were analysed for plasma levels of thrombin anti-thrombin complex (TAT), tissue factor (TF), tissue factor pathway inhibitor (TFPI) and D-Dimer. Significant differences for TAT, TF or TFPI (P>0.05).

Results: Marathon running significantly increased plasma concentrations of TF and D-Dimer in both the CONTROL (p<0.001) and SOCK (p<0.05) groups, whereas no significant increases were observed in TAT or TFPI (p≈0.05). The magnitude of change (PRE-POST) for D-Dimer was significantly greater in the CONTROL group, when compared to SOCK (p≈0.008), but there were no significant differences for TAT, TF or TFPI (P≈0.05).

Conclusion: Whilst activation of coagulation and fibrinolysis was apparent in runners assigned to both the CONTROL and SOCK groups, our results suggest overall coagulation and fibrinolytic activation tended to be lower within the SOCK group. Therefore, compression socks may reduce exercise-associated haemostatic activation when completing prolonged strenuous exercise.

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A systematic review and meta-analysis of the safety, feasibility and effect of exercise in women with stage II+ breast cancer

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Purpose: There is compelling evidence demonstrating the health and potential survival benefits of exercise for women with breast cancer. However, research demonstrating these benefits has mostly been derived from studies involving women with stage I-II disease. This meta-analysis evaluated the safety, feasibility and effect of exercise among women with stage II+ breast cancer.

Methods: Randomised controlled trials (RCTs) that examined exercise among samples involving at least 50% diagnosed with stage II+ breast cancer were identified using an electronic database search. Risk of bias was assessed and adverse event severity was classified using The Common Toxicity Criteria. Intervention feasibility was evaluated by computing median (range) recruitment, withdrawal and adherence rates. Meta-analyses were performed to evaluate exercise effects on health outcomes including quality of life (QOL), fitness, fatigue and body composition.
Barriers and Facilitators to Yoga Participation - A Scoping Review

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Introduction and Aims: Yoga has become a popular form of physical activity for health and well-being over the last two decades. While yoga participation in the US and UK has been increasing, participation in Australia appears to have plateaued. A scoping review is therefore conducted to identify barriers and facilitators to yoga participation, examine the breadth of research activities done in this topic, and report possible gaps in the literature.

Methods: A scoping review framework consisting of the following steps guides this review: identification of review questions, identification of relevant studies, study selection, data charting, collating/summarizing/reporting results, and optional stakeholders' consultation. We asked the broad question, "What are the barriers and facilitators to yoga participation?"

Results: Ten electronic data bases were searched in September 2017 using the terms "barriers", "facilitators" and "yoga" identifying 3,843 records after duplicates were removed. Additional 93 records were found through hand-searching yoga-specific journals. Titles and abstracts were then screened by two independent reviewers identifying 322 records for possible inclusion. Full texts were reviewed and are currently being screened using the following criteria: samples with adults ≥18 years, study involves participation in asana-based yoga, and study assessed perceived barriers and facilitators, including perceived benefits and motives, to yoga participation.

Conclusion: Results of this review should enable identification of barriers and facilitators to yoga in a variety of contexts, population, and settings. This knowledge may then be used to inform program promotion strategies and future research. Given that yoga offers a more holistic approach to health and well-being, identifying factors influencing participation or non-participation can enhance understanding on how to best promote this holistic movement practice.

How reliable are fat utilisation assumptions for individualised clinical care?

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Introduction: Obesity is a disease of fat storage and reduced fasting fat utilization, commonly assessed from Respiratory Quotient (RQ) using Indirect Calorimetry (IC), and impacts weight, weight regain and health (1). Measurement of RQ could provide a basis for individualised nutritional and lifestyle intervention for successful obesity management. However, until now the cost and complexity of technology has precluded its widespread use in the clinical setting (2).

Objectives: To assess the value of RQ measurement in the clinical setting, we investigated the fasting RQ and fat utilisation of 282 overweight and obese adults and compared to normative data indicating an RQ of 0.81, corresponding to a fuel utilization ratio of 62% Fat and 38% CHO (3). Secondary to this, we can observe the effect of fasting times between 4-8 hrs and >10 hrs on RQ.
Material & Methods: We conducted a retrospective analysis of the metabolic data of overweight and obese individuals, measured at a primary care clinic using ECAL, an IC developed by ETSA (4). Respiratory Exchange Ratio (RER) was measured during testing, and is equivalent to RQ and fuel utilization at a cellular level (5). Subjects were instructed to observe a minimum of 4 hours fasting time before the test, following a protocol developed for clinical practice (2).

Results: 171 (60.6%) of subjects recorded sub-optimal fat utilization defined as having RQ > 0.81 (3). For the 4-8 hr fasted subjects, 93 (56.4%) had an RQ > 0.81. For the >10 hr fasted subjects, 74 (66.7%) had an RQ > 0.81.

Conclusion: The results suggest that assumptions of fat utilisation have limited value for overweight and obese individuals and highlight the need for measurement of RQ to provide tailored obesity management. Overall, more than half of the subjects exhibited sub-optimal fat utilization irrespective of whether they had fasted for 4-8 hrs or >10 hrs, further suggesting the importance of RQ and IC for the clinical management of overweight individuals.
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Perceived Motor Competence in Children Aged 12-18 years in Regional and Rural Western Victoria

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Poor motor skill development is an increasing issue for children in our local communities and recent research suggest that up to 10% of children have fundamental motor skills below that expected for their age. In 2012, almost 20% of Ballarat children starting school were considered developmentally vulnerable in at least one of the five areas tested: physical health (FMS), social competence, emotional maturity, language skills and communication skills. Poor motor skill development has a number of negative consequences across a range of areas, including school work, self-esteem, long-term health, behaviour and peer relationships, which continue into adolescence for 50-70% of these children. So timely identification of motor difficulties is crucial to minimise these negative consequences.

To date there have been no valid and reliable self-report measures to identify level of motor competence among 12-18 year old adolescents. However, the recent development of the Adolescent Motor Competence Questionnaire (AMCQ) has addressed this shortfall. The AMCQ is a self-report questionnaire to assist on identifying adolescents with probable Developmental Coordination Disorder (DCD). The questionnaire uses a 4 point response format of Never (1), Sometimes (2), Frequently (3), and Always (4). It includes items on functional and common motor skills and includes activities of daily living. The 26-item questionnaire was informed by the diagnostic criteria of A and B as outlined by DSM-5. The criteria of C and D (intellectual disabilities or visual impairments) could not be addressed within the development of the AMCQ. To receive a formal diagnosis of DCD, further assessments would need to be completed.

As part of the ongoing validation and cultural adaptation the current study is validating the AMCQ in regional Victoria with a minimum of 300 representative adolescents. Data collection is underway and the results for regional Victoria will be presented at the conference.

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Investigating strength profiles and hypermobility in children with varying levels of movement proficiency

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Introduction: Children with low movement proficiency (MP) produce less muscular force than their typically developing (TD) peers. Joint hypermobility, due to its association with muscle weakness, may also be associated with low MP. This study aimed to compare hypermobility and strength profiles in children with varying MP.

Methods: 64 children (mean age 7.91±1.5yrs) participated. MP was assessed using the Movement Assessment Battery for Children-2; 41 children were classified as TD, 10 classified ‘at risk' of movement difficulties; and 13 with confirmed movement impairments (CMD). Children completed the Resistance Training Skills Battery for Children (RTSBc) and 5-repetition maximum (5RM) leg press. Isometric and isokinetic peak torque of the knee flexors and extensors were assessed using a Biodex dynamometer. Hypermobility was measured using the Beighton and Lower Limb Assessment Score.

Results: Between groups ANOVA revealed RTSBc scores to be significantly different (F(2,61)=13.179, p<.001), with TD children scoring significantly higher than those ‘at risk’ (p=.021) and with CMD (p<.001). 5RM scores were also significantly different between groups (F(2,61)=5.618, p=.006), but only between TD children and CMD group. No differences were found between groups for isometric or isokinetic measures of strength. Sequential regression analysis revealed strength variables (5RM & total RTSBc) explained 41% of variance in MP (F(6,63) = 8.311, p < .01), with the total RTSBc (β = .479, p < .001) and 5RM (β = .278, p = .019) emerging as positive significant predictors. Hypermobility failed to explain significant variance in MP beyond that explained by strength (R² change = .002, F change (1,56) = 1.58, p = .692).

Conclusion: Strength profiles of children vary according to level of MP. Furthermore, strength may be an important predictor for MP; however contrary to previous literature, hypermobility was not.
Ventricular assist device implantation is associated with higher levels of physical activity in patients with advanced heart failure

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Introduction & Aims: Ventricular assist devices (VAD) are implanted to augment cardiac output in advanced chronic heart failure (CHF). VAD are associated with an increased survival, quality of life and aerobic capacity in patients with CHF. However, few studies have evaluated the effects of VAD on daily physical activity. The primary aim of this study was to assess physical activity levels in participants with VAD compared to well-matched participants with CHF.

Methods: Sixteen participants with a VAD in situ (age: 59.1±10.8 years) were case-matched to sixteen advanced CHF participants (age: 58.3±8.7 years) listed or being considered for cardiac transplantation. All participants underwent a cardiopulmonary exercise testing to determine peak oxygen consumption (peak VO2). Physical activity was monitored continuously for seven days with an Actiheart accelerometer. Between group differences were compared with independent t-tests. Spearman correlation coefficient was applied to determine associations between variables. Statistical significance was set at p<0.05.

Results: The VAD group achieved higher levels of physical activity (1691±707 kJ/day) compared with the CHF group (945±680 kJ/day; p=0.013). Participants with VAD spent significantly more time exercising at moderate intensity (3.6 METs) than their CHF counterparts (3.1±22 minutes/day vs 12±17 minutes/day respectively; p=0.012). Peak VO2 was significantly higher in the VAD (15.4±4.3ml/kg/min) versus CHF group (12.3±3.5ml/kg/min; p=0.038) and was positively correlated with physical activity when the data was pooled for both groups (r=0.523, p=0.003).

Conclusion: VAD implantation results in higher levels of physical activity than is observed in patients with advanced CHF, but no VAD. This may be due to a high peak VO2, which results in an enhanced capacity to perform activities of daily living. These results highlight the beneficial effects of VAD implantation on functional capacity in people with advanced CHF.

Long-term effects of supervised high-intensity-interval training on fatigue, health-related quality of life and symptoms- preliminary findings from the OptiTrain trial

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Introduction and aims: Increasing evidence exists of the benefits with exercise for patients with breast cancer. Studies have shown positive effects on cancer-related fatigue (CRF), health-related quality of life (HRQoL) and symptom burden. However, there is a lack of studies on long-term effects. Therefore the aim was to study change over time in CRF, HRQoL and symptoms in a sample of women with breast cancer previously randomized to two exercise regimens or usual care during chemotherapy treatment.

Methods: A sample of Swedish women with stage I-IIIA breast cancer were randomized to 16 weeks of supervised resistance and high-intensity-interval training (RT-HIIT), moderate-intensity aerobic and high-intensity interval training (AT-HIIT) or usual care (UC) during chemotherapy treatment. Self-reported measurements were performed at baseline, post-intervention (16 weeks) and 12 months post-baseline. Fatigue was measured with Piper Fatigue Scale, HRQoL with EORTC-QLQ-C30 and symptoms with Memorial Symptom Assessment Scale. Statistical tests included a two-tailed analysis of covariance with adjustments for baseline scores.

Results: Preliminary findings for change over time; AT-HIIT and RT-HIIT reported non-significant changes for CRF while UC had a significant increase and vs both AT-HIIT and RT-HIIT for Behavior/daily life- and Total CRF. Affective CRF showed a significant increase for UC and vs RT-HIIT and Cognitive CRF a significant increase for UC and vs AT-HIIT. HRQoL displayed no significant differences in changes on the functional scales. Change over time on symptoms; AT-HIIT reported significantly lower levels on Symptom burden and Total symptoms vs UC and both RT-HIIT and AT-HIIT displayed significantly less Physical symptoms vs to UC.
Conclusion: Changes over time for self-reported CRF and symptoms among women with breast cancer, randomized to AT-HIIT or RT-HIIT, are promising and further indicate the benefits of engaging in HIIT during chemotherapy treatment.
Medical treatment predicts the functional capacity of cardiac rehabilitation patients

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Introduction & aims: Reduced functional capacity, including walking capacity and muscle strength, is commonly observed in individuals who have experienced a recent cardiac event or cardiac surgery. This study investigated the functional capacity of patients entering cardiac rehabilitation in relation to the type of medical treatment received (surgical: CABG or valve surgery; non-surgical: PCI or medical management) and age.

Methods: The functional capacity of 85 patients (62.1 ± 10.5 years; 89% men) was assessed prior to commencing cardiac rehabilitation. Walking capacity was determined using an incremental shuttle walk test, with total distance walked converted to METs using a published regression equation. Muscle strength was assessed in each hand with a digital hand-grip dynamometer (Jamar Plus+, Patterson Medical, Warrenville, IL, USA). Participants were categorised as younger (<65 years) and older (≥65 years) within each medical treatment category (surgical, non-surgical).

Results: The mean (95% CI) baseline walking capacity was significantly lower for patients who had received surgical treatment (5.7 (5.3 to 6.1) METs) compared to those treated non-surgically (6.4 (6.0 to 6.8) METs). There was no difference in hand-grip strength between surgical (35.7 (32.1 to 39.2) kg) and non-surgical (37.7 (34.7 to 40.6) kg) patients. Younger surgical patients had a higher walking capacity and grip strength than their older counterparts, although differences in grip strength were not statistically significant (p = 0.050). Age did not influence walking capacity (p = 0.144) or grip strength (p = 0.233) in non-surgical patients.

Conclusion: Cardiac surgery was associated with lower levels of walking capacity in patients commencing a cardiac rehabilitation program. Age appears to have an accumulative negative effect in addition to surgery on walking capacity in cardiac rehabilitation patients, which has important implications for delivery of cardiac rehabilitation.

Complex interplay between vitamin D and exercise in skeletal muscle function

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Introduction and Aims: Vitamin D (VitD) supplementation enhances skeletal muscle strength and fatigue resistance in deficient humans, and elevated VitD has been associated with improved exercise performance. However, high bolus dose VitD has been linked with increased risk of falls, possibly through decreased muscle strength. Thus, the aim of this study was to investigate the effects of high doses of VitD and exercise training alone and in combination.

Methods: Four-week old C57Bl/10 mice (n=32) were fed a normal VitD (1,500 IU/kg) or high VitD (20,000 IU/kg) diet, with or without voluntary access to a running wheel. After 8 weeks of intervention, in vivo body composition (EchoMRI) and whole body metabolism (Promethion metabolic cage) were measured before the excision of muscles for ex vivo contractile and fatigue analysis.

Results: VitD had no effect on running performance, but improved body composition. High VitD decreased force production in the slow-twitch soleus (SOL) muscles of sedentary mice, however exercise prevented this decline. Eight weeks of voluntary exercise did not improve fatigue resistance of the fast-twitch extensor digitorum longus (EDL) or SOL muscles in unsupplemented mice, likely due to low levels of activation in these muscles. Despite minimal activation, fatigue resistance was improved in EDL and SOL muscles in the exercised animals that also received the high VitD diet.

Conclusions: Increasing VitD levels above normal does not improve voluntary exercise performance, but shifted body composition to a more favourable phenotype. Decreased postural muscle force may contribute to the increased risk of falls observed with high VitD in some studies. Importantly, when supplementation was combined with exercise, force production was
effectively restored, and fatigue resistance improved. Regular exercise may positively modulate the effects of VitD on skeletal muscle, and be recommended where high VitD supplementation is required.
**Living with Stroke: Physical Exercise as rehabilitation strategy to improve quality of life during the disease continuum from diagnosis to daily living recovery**

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**Introduction:** The amount of people who survive a stroke is increasing annually. Stroke patients suffer neurological deficits and a physical deconditioning that compromise walking ability, daily living activities (ADL) and health-related quality of life (HRQOL).

**Aims:** To evaluate the effectiveness of a Rehabilitation Programme based on Aerobic Exercise (PREA-QdV) in stroke patients. To improve their physical condition and their HRQOL through the perception of improvement of the symptoms in their everyday life context.

**Methods:** This paper will present a pilot study carried out in Catalonia (Girona) NHS Hospital. The study methodology is based on between-methods triangulation, that is, the combination of qualitative and quantitative methodological approaches. Quantitative method focuses on the evaluation physical and medical variables and qualitative method will focus on participants’ perception of improvement in their everyday life context. The project carries out a prospective quasi-experimental design with measurements pre-post intervention with stroke patients after their hospital period of rehabilitation.

A total of 30 participants undergo the PREA-QdV consisting of a 12-week intervention of one hour sessions two days per week. The intervention will be performed in groups of 6 participants with a Physical Activity and Sports Sciences professional leading the sessions. Quantitative data will be collected in three moments: before initiating the intervention; at the end of the intervention program and; 6 months after treatment. Qualitative information will be generated by in-depth interviews and focal groups with participants and carers. The interviews and focus groups will be recorded.

**Conclusion:** Physical activity and exercise Programme is an effective treatment to improve stroke patients physical condition and to improve their QOL on their daily living.

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**Exercise-induced dehydration does not impair cognitive function: A meta-analysis**

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**Introduction:** The maintenance of optimal cognitive function is key to success in multiple exercise contexts. Namely, sporting situations where decision making is fundamental to establishing a tactical advantage over opponents. Considering this, interest into physiological states capable of impairing optimal cognitive function feature prominently within the literature. Currently, a number of narrative reviews exist, supporting the conclusion that exercise-induced dehydration (EID) compromises cognitive function. However, upon critical analyses of the literature, evidence implying no relationship among these variables also exists. To explain these equivocal findings, variables such as fatigue and elevated core temperature have previously been highlighted to potentially confound results. Therefore, the purpose of this meta-analysis was to determine whether EID impairs cognitive function, independent of possible confounding factors.

**Methods:** A manual search of the literature identified seven citations meeting all pre-determined criteria. Critical for inclusion was that a rest-period was completed post-exercise, and that comparisons could be made to a euhydration exercise condition (cross-over design). All cognitive tests administered were organised into the following cognitive domains; executive function (EF), learning and memory (LM), and complex attention (Att).

**Results:** In contrast to previous narrative reviews, EID was not found to have a negative effect on EF (standard mean difference (SMD) = -0.38; 95% confidence interval (CI); -1.00-0.24); LM (SMD = -0.05; 95% CI; -0.64-0.54), or Att (SMD = 0.02; 95% CI; -0.25-0.29).

**Conclusion:** Findings suggest that when attempts are made to control for confounding factors, EID alone may not impair cognitive function. Accordingly, recommendations to avoid EID to maintain optimal cognitive performance are not substantiated by this investigation. Alternative variables to explain possible decrement should therefore be examined.
VITAL change for mums: A feasibility study investigating video-consultations for tailored exercise and nutrition care for postpartum women

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Introduction & Aims: Innovative health care approaches are required to help postpartum women overcome barriers to accessing support to achieve healthy lifestyle recommendations to limit postpartum weight retention. Video-consultations enable remote delivery of real-time health-care, reducing the need for women to travel to in-person consultations. This study evaluated the feasibility, acceptability and preliminary efficacy of tailored postpartum exercise and nutrition video-consultations delivered by Accredited Exercise Physiologists (AEP) and Accredited Practising Dietitians (APD).

Methods: Thirty women (31.6±3.1 years, BMI 29.0±4.0 kg/m²) who were 3-12 months postpartum, had internet access, and wanted to achieve a healthy weight (BMI ≥25 or >2kg above pre-pregnancy weight) enrolled in the 8-week study. Participation included up to 5 (2xAEP, 2xAPD, 1x optional AEP/APD) video-consultations focused on personalised exercise and nutrition advice. The Godin Leisure Time Exercise Questionnaire (GLTEQ) and the Queens College Step Test assessed physical activity and cardiorespiratory fitness (VO₂max), respectively.

Results: Completers (n=27) lost a mean of 1.2±1.9 kg (p=0.001) fat mass with three women (11%) achieving ≥5% weight loss. The percentage of women sufficiently active (GLTEQ ≥24) improved (30.0% to 66.7%). Cardiorespiratory fitness (ml/kg/min) improved (35.1±3.3 vs 36.1±3.1; p=0.02, d=0.32). Twenty-six women (96.3%) completed all allocated video-consultations and 12 (44.4%) utilised the fifth optional session (7xAEP & 5xAPD). Most reported being comfortable interacting with health professionals online (92.6%, n=25) and agreed that using AEP and APD video-consultations was easier than attending in-person consultations (88.9%, n=24; 85.2%, n=23, respectively).

Conclusions: Individualised counselling from an exercise physiologist and dietitian provided via video-consultations is feasible and acceptable to postpartum women and offers a viable alternative to in-person care.

Accumulating exercise for glycaemic regulation: a systematic review and meta-analysis

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Introduction and aim: Physical activity recommendations for health and fitness suggest that exercise can be accumulated in multiple short bouts of 10 minutes or more throughout the day. This systematic review and meta-analysis aimed to compare the effect of accumulating exercise in multiple short bouts throughout the day with exercise completed in a single-bout on glycaemic regulation.

Method: Seven databases were systematically searched to identify articles measuring the effects of six weeks or more of aerobic exercise on glycaemic regulation in a population of insufficiently active, apparently healthy adult humans (18 to 64 years). Studies were eligible for meta-analysis if accumulated and single-bout exercise were directly compared or if either were compared to no-exercise control. Eighteen randomised controlled trials of varying exercise intensity involving 1362 participants were meta-analysed using RevMan. Study and outcome quality of evidence of the included meta-analyses were assessed using GRADEpro GDT software.

Results: Only one study compared accumulated exercise to single-bout exercise finding no significant effect on fasting glucose (95% CI: -0.05 to 0.24 mmol·L⁻¹) or fasting insulin (95% CI: -1.79 to 9.85 pmol·L⁻¹) assessed 48h after the final bout. No studies compared accumulated exercise to no-exercise. A low-to-moderate quality of evidence indicated a significant overall effect in favour of single-bout exercise compared to no-exercise for fasting glucose (MD: -0.24 mmol·L⁻¹; 95% CI: -0.45 to -0.04) but not for fasting insulin (MD: -11.97 pmol·L⁻¹; 95% CI: -24.26 to 0.32) assessed 36-48h after the final exercise bout.

Conclusion: Regular exercise participation positively affects glycaemic regulation for up to two days after the final exercise bout. Accumulating exercise in multiple shorter bouts might not be different from a single exercise bout, however there is no evidence that allows a categorical statement of how exercise therapy should be prescribed.
A cross-sectional study exploring exercise volume and physical activity levels between morning and evening exercisers

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Introduction and aims: Despite well-documented health benefits, rates of physical activity are low, highlighting the need to better understand which factors contribute to increasing physical activity levels. Early morning or evening are ideal opportunities for people to increase activity levels, because they are less likely to interfere with work or personal commitments. However, little is known about whether people are more likely to be active if they exercise in the morning or if they exercise in the evening. The aim of this study was to explore if there is an association between the duration of physical activity and the time of day that physical activity is performed.

Methods: This cross-sectional study included 70 healthy, sufficiently active adults (age 35±12 years; females= 60%; BMI= 24±4 kg/m²). Physical activity over 7 days (including volume, time of day and type of exercise) was assessed through an interviewer-assisted questionnaire, and 7-d accelerometer. Individuals who performed ≥75% of exercise sessions before-, or after-midday were considered morning or evening ‘time-structured exercisers’, respectively. Remaining individuals were considered ‘time-flexible exercisers’. Associations between exercise volume and structured vs flexible and morning vs evening structured exercisers were explored using independent samples t-tests. Data are presented as mean ± SD.

Results: There was no significant difference in exercise volume between ‘time-structured exercisers’ (n=31) and ‘time-flexible exercisers’ (n=37; 350±210 vs 317±179 min/week, respectively). Morning ‘time-structured exercisers’ (n=14) performed a significantly greater volume of exercise than evening ‘time-structured exercisers’ (n=23; 399±163 vs 320±232 min/week, respectively, p=0.04).

Conclusion: Morning exercise appears to be associated with an increase in the volume of exercise performed compared with evening exercise among individuals who keep their exercise time of day relatively consistent.

The Effects of Acute Prednisolone Ingestion on Exercise Performance, Blood Glucose and Haematology

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Introduction & Aims: Glucocorticoids are commonly administered for numerous acute and chronic medical conditions, however, treatment can result in severe side effects. Additionally, glucocorticoids are on the World Anti-Doping Agencies list of banned substances, due to their potential as an ergogenic aid. Therefore, the aims of this study were to investigate the effect of a single dose of prednisolone on (A) high-intensity interval cycling performance and (B) post-exercise metabolism and haematology.

Methods: Nine healthy young men participated in two separate exercise sessions, twelve hours after ingesting either 20 mg of prednisolone or placebo. The 30 min exercise protocol involved high intensity interval cycling (4 × 4 minute bouts at 90 - 95% of peak HR). The cycling workload (Watts) of the two sessions was matched for HR.

Results: Prednisolone significantly reduced the total work (Watts) completed by (5%) (p < 0.05) compared with placebo. This equated to a 17-Watt reduction in work output in the final cycling bout. Prednisolone significantly increased basal blood glucose by 1.3 mmol/L (p < 0.001), however, 3 hours post exercise blood glucose had returned to baseline levels, with no difference compared to placebo (p > 0.05). Prednisolone ingestion caused a significant reduction in blood lactate levels immediately post-exercise (17%, p < 0.05), and significantly elevated the total white blood cell count at baseline and for up to three hours post exercise (25-38%, p < 0.05).

Conclusions: Acute glucocorticoid treatment caused significant reductions in total work performed, for the same relative HR,
during high intensity cycling. Furthermore, exercise may be an important tool for minimising glucocorticoid induced hyperglycaemia, which has potential clinical implications for those undergoing glucocorticoid therapy.
Exercise heat stress induces gastrointestinal damage and impairs neuromuscular performance

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Strenuous exercise in the heat damages the gastrointestinal (GI) tract, leading to endotoxin (LPS) release and an inflammatory cytokine response. Elevated cytokine expression has been linked with sensations of fatigue in diseased states, but it is unknown if these cytokines might also contribute to central nervous system changes in voluntary activation (VA) of skeletal muscle during exercise performance. This study aimed to examine the effect of cycling in the heat on GI damage, inflammation and neuromuscular function.

Eleven trained male cyclists (58.7±6.1 mL·kg⁻¹·min⁻¹) completed 20 min cycling sessions, comprised of 30 min of 3 min intervals (50% and 70% P_max) and 30 min at 50% P_max. Environmental conditions were controlled at 35° C (HOT) or 20° C (CON). Measures of physiological (core and skin temperature, heart rate) and perceptual strain were recorded during exercise. Neuromuscular function (torque, VA, contractile properties) and recruitment (EMG) of the knee extensors were assessed pre-, post- and 1-h post-exercise. Blood samples were also collected at these time points to determine the level of inflammation (IL-1β, IL-6, IL-10, TNF-α, LPS), GI permeability (CLDN-3) and GI damage (IFABP).

Heart rate and core and skin temperature were higher in the HOT trial compared to the CON post-exercise (P<0.01). Maximal torque and VA were reduced compared to pre-exercise levels in both conditions (P<0.01); however, lower VA was observed post-exercise in the HOT than the CON trial (83.2±10.1% vs 87.9±7.6%; P<0.001). IFABP was higher in the HOT compared to the CON trial post-exercise (121% increase; P<0.001). No differences were observed in markers of inflammation or GI permeability.

Sub-optimal neuromuscular activation during exercise in the heat appears to coincide with increased expression of GI damage. Whether this occurrence represents a cause and effect is unclear, though these finding may highlight the gut as a potential target for ergogenic intervention.

Resistance training intensity does not affect cardiovascular response

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Introduction & Aims: Elevated blood pressure is a risk factor for cardiovascular disease. Post-resistance exercise hypotension is observed for up to 60 min, but it is not clear if there is a difference between low-intensity or high-intensity resistance exercise. This study evaluated the acute blood pressure response to work-matched, high- and low-intensity resistance exercise sessions.

Methods: Eight healthy individuals (4 males, 4 females) volunteered for this randomised crossover study. Participants were (mean±SD) 25.1±10.3 years old, 174±8 cm tall and weighed 73.5±20.1 kg. In a counter-balanced order, participants completed a session of low-intensity (3 sets of 16 repetitions at 40% 1RM) and high-intensity (3 sets of 8 repetitions at 80% 1RM) resistance exercise for 5 different exercises (bench press, leg press, bent-over row, calf-raise, shoulder press). Arterial blood pressure was measured using an Omron electronic sphygmomanometer before each exercise trial, and immediately, 30, 60, 90 and 120 min after each exercise trial. Exercise was completed after an overnight fast with no nutritional intake before or for two hours after the trial, in which period participants sat quietly.

Results: There was no interaction between intervention and time for systolic blood pressure (SBP; p=0.41), diastolic blood pressure (DBP; p=0.19) or mean arterial pressure (MAP; p=0.06) over 60 min post-exercise. Over 2 hours post-exercise, no interaction effect remained for SBP (p=0.17) and DBP (p=0.16). However, the response for MAP was different with each exercise trial (p=0.006). MAP peaked at 99.6±9.3 mmHg at 60 min after high-intensity exercise compared to 98.8±9.6 mmHg immediately after low-intensity exercise, before reducing and then fluctuating.

Conclusion: Although SBP or DBP respond similarly to work-matched low-intensity or high-intensity resistance exercise, MAP responds differently. Low-intensity resistance exercise might be considered most appropriate reduce cardiovascular risk.
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Living Longer, Living Better: The Geelong Rehabilitation Centre experience of engaging Aged Care Managers to achieve better health outcomes for older Victorians

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The Aged Care (Living Longer, Living Better) Act of 2013 was the result of a comprehensive review ensuring care remains sustainable and affordable. Reforms resulted in stronger emphasis on self-directed care; promoting choice and control for older people and their families. Traditional models of case management place the practitioner as subject matter expert, however the new guidelines support consumer direction and investment in upstream health interventions to reduce the cost of care downstream.

The South Barwon region served as a trial site for reforms including early implementation of the National Disability Insurance Scheme. As a boutique agency, GRC was ideally placed to respond nimbly to clients wishing to incorporate exercise physiology and related services into care plans. Practitioner led remedial exercise offered cost savings of approximately 33% compared with personal care intervention in older individuals. Proactive upstream management delayed progression to more expensive downstream interventions, promoting improved quality of life and independence. In addition, the GRC cohort report positive quality of life impacts.

A key challenge in maximising the benefits of EP within the community is ensuring that aged care practitioners fully understand the role of EP in maximising independence and ultimately, reducing the overall cost of care. From a client perspective, GRC have found that there has been an exponential increase in interest in exercise interventions, supported by the compelling testimonies of older individuals.

GRC has seen significant an increase in referrals via funded agencies, making community based exercise physiology more accessible. Consumer directed care has lead to increased uptake of remedial exercise in older people in the community, and overall, a decreased cost of care.

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Haemodynamic and perceptual responses to blood flow restriction cycling during dialysis for patients with end-stage kidney disease: A pilot study

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Introduction: Individuals with end stage kidney disease (ESKD) have reduced exercise capacity and impaired muscle structure and function. Exercise interventions during haemodialysis (HD) can improve physical function. However, increasing muscle strength and size and aerobic capacity requires volumes and intensities of exercise that are too demanding for patients with ESKD. Blood flow restriction (BFR) exercise enhances muscle strength and size, even with aerobic exercise, where equivalent-intensities are traditionally insufficient for these adaptations. Investigation of this technique appears in ESKD, but is yet to be evaluated in this population.

Methods: 10 patients receiving HD underwent supervised low-intensity aerobic exercise over 15 days in a three-phase sequential design. Phase 1: 2 bouts of cycling during 2 HD sessions. Phase 2: 2 bouts of cycling with BFR whilst off HD on 2 separate days. Phase 3: 2 bouts of cycling with BFR during 2 HD sessions. Participants with known significant or symptomatic cardiovascular disease or haemodynamic instability on HD were excluded. Outcomes included heart rate (HR), blood pressure (BP) during exercise and recovery and perceptual responses (on a Borg rating scale – exertion (RPE) and discomfort (RPD)) to the exercise.

Results: All 10 patients completed all phases of the study. Significant increases in HR, systolic BP (SBP), diastolic BP (DBP) and mean arterial BP (MAP) were observed immediately post each exercise bout, with no significant differences between phases. Reductions from baseline in mean SBP, DBP, and MAP during recovery of 11.7 ± 14.6, 4.7 ± 8.8, and 10.5 ± 9.5 mmHg, respectively, were significant, without any difference between phases. One possible adverse event involving an episode of self-resolving pre-syncpe after completion of a Phase 3 exercise session occurred.
Conclusions: Haemodynamic safety and tolerability of BFR aerobic exercise during HD is comparable to traditional aerobic exercise during HD.
The effect of lower limb compression during exercise on cardiac regulation in orthostatic intolerance/postural orthostatic tachycardia syndrome

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Introduction: Orthostatic Intolerance/Postural Orthostatic Tachycardia Syndrome (OI/POTS) is characterised by postural hypotension and/or tachycardia. This study assessed the effect of medical-grade lower limb compression garments and a placebo garment on cardiovascular regulation in individuals with OI/POTS during exercise.

Method: Fourteen participants (11 females, 3 males) aged 25 ± 5 years, with a clinical diagnosis of OI/POTS participated in this randomised cross-over trial. Participants completed an incremental exercise test on a treadmill (Astrand protocol) wearing either low-limb compression (JOBST) or placebo (Skins) seven days apart. Measurements of blood pressure and heart rate (HR) were taken prior to, immediately and 5 minutes following exercise.

Results: Systolic blood pressure (SBP) response between interventions was significantly different over time in response to the exercise test (F(2,26) = 5.55; p = 0.01). Immediately after exercise, SBP tended to be higher (p = 0.06) in the compression trial (149.0 ± 13.6 mmHg) than the placebo (137.1 ± 17.7 mmHg). Intervention order affected SBP (F(2,24) = 5.69; p = 0.01) with an elevated response when compression was completed after placebo. There were no significant interaction effects for diastolic blood pressure (F(1.2,16.1) = 0.43; p = 0.57) or HR response (F(2,26) = 0.59; p = 0.56). However, average HR throughout the placebo trial (123.6 ± 14.5 bpm) was higher (p = 0.02) than throughout the compression trial (116.8 ± 11.8 bpm).

Conclusion: Increased SBP leads to decreased symptoms and improved recovery from exercise, allowing effective exercise-based treatment of OI/POTS. Compression garments demonstrated an increase in blood pressure in response to exercise compared to placebo. The recommendation to use compression garments during exercise in individuals with OI/POTS appears justified.

Exercise On Dialysis

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Introduction & Aim: Haemodialysis (HD) patients have an increased risk of physical inactivity, falling, functional disability, functional dependence, cardiovascular morbidity and mortality and hospitalisation. HD patients sit for 4-5 hours, 3 times a week, which exacerbates an already sedentary lifestyle. The aim of this pilot project was to improve the physical function & overall health of HD patients, through implementation of a 10-week resistance training exercise program while on HD.

Methods: Collaborated with renal team, nephrologists, patients and Kidney Health Australia prior to program implementation. Sit to stand (STS), arm curl and 3m timed up and go (TUG) tests were completed pre, post and at 3 and 6 month follow up. A generic program of 10 exercises with individualized prescription for sets, reps and resistance using dumbbells and ankle weights was completed within first 2 hours of HD without involvement of AV fistula limb. 1 session per week instructed by EP and 2 sessions per week championed by nursing staff. Patients and renal staff were surveyed on completion of program.

Results: 8 patients completed the 10 week program, 3 patients declined to participate. Average post 10 week results were: 66% increase for STS, 35% increase for arm curl and 36% increase for TUG. Patients noted benefits of: Improved fitness, strength, power, QOL, blood pressure, sleep and flexibility plus reduced restless leg syndrome, muscle stiffness and pain. All patients who were not previously completing regular exercise stated they had started completing regular exercise at home. At 3 and 6 month follow up: TUG improvements had not been maintained, arm curl improvements had been maintained or improved further in 6/7 patients and STS improvements had been maintained 4/5 patients.

Conclusion: Exercise Physiology has demonstrated great potential to contribute to the holistic and multidisciplinary care of HD patients while not adding to the patients’ medical/health appointment burden.
Implementation of a specialised exercise intervention for an 8 year old with severe gross motor developmental delays and comorbid mental health

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**Introduction:** This case study explores the effectiveness of an exercise physiology intervention for a child with complex mental health needs during a 6 week admission on a child mental health inpatient unit. The patient presented with disinhibited attachment disorder, pervasive development disorder, attention-deficit-hyperactivity disorder, pica disorder, and tourette’s on a background of Post-Traumatic Stress Disorder. The child was referred to exercise physiology for an assessment of gross motor performance. This was assessed by observing the child complete a series of fundamental movement skills. Collateral information was also collected from the child’s guardian.

**Method:** An exercise intervention was designed to improve the child’s fundamental movement skill deficits. The child participated in daily 30 minute sessions. Each session included a warm up, bilateral coordination training, dynamic balance training, and a cool down. The delivery was significantly modified to accommodate for the child’s behavioural disturbance and the presence of an attachment disorder. The intervention was delivered by a student exercise physiologist under supervision of a senior exercise physiologist. Adherence and engagement in the session was high.

**Results and Conclusion:** After the 6 week intervention the child displayed improvements in muscular strength, dynamic balance, proprioception and bilateral coordination. This translated to an overall improvement in fundamental movement skill performance from a 4-5 year old baseline to a 6-7 year old at the time of discharge. The child also reported enjoyment from participation in the sessions. The results of this case study suggest that: (1) a child with complex mental health needs has the capacity to learn and improve gross motor performance through exercise physiology intervention, and (2) exercise physiologists possess the skills necessary to deliver successful exercise-based interventions to these children. Research in this area is indicated.
Exercise prescription in the digital age: feasibility of a telehealth-to-home exercise intervention for liver transplant recipients

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Introduction & Aims: Liver transplant recipients (LTR) are a geographically dispersed group at high risk of obesity and cardiometabolic complications. We aimed to evaluate the feasibility of a 12-week telehealth exercise intervention, and to determine whether LTR can accurately conduct clinical and functional tests, without supervision, in the home-based setting.

Methods: Exercise sessions were delivered via internet-based telehealth (weekly for 4 weeks, then fortnightly) by an accredited exercise physiologist with 1-4 participants/session. Feasibility was assessed by recruitment rate, attendance, adequacy of technology and participant confidence with home technology. At baseline, trained researchers measured: body weight, waist circumference, repeated chair stand, push-up test, and 6-minute walk test (6MWT). LTR were provided with exercise equipment and access to online tutorials and repeated all measures unsupervised at home within approximately one week of the baseline assessments. Intraclass correlation coefficients (ICC) and Bland-Altman plots compared reliability and agreement between the researcher and participant measures.

Results: 28 LTR enrolled (50 ± 15 years, 64% male, recruitment rate 24%). Attendance to weekly sessions was 56%. Adequacy of telehealth technology was rated 91% by staff and 89% by LTR. Participant confidence with home technology was 92%. Thirteen participants (46%) undertook repeated measures at home. The mean difference ± SD and upper to lower limits of agreement for scores between researcher and LTR were: weight, 1.1 ± 1.5kg (-1.8 to 4.0kg); waist, 1.0 ± 2.6cm (-4.0 to 6.0cm); chair stand, 0.4 ± 1.7s (-3.1 to 3.8s); push-ups, -2.9 ± 4.5 (-11.8 to 6.0); 6MWT, 64 ± 7.2m (-134 to 147m). ICCs were >0.95, except chair stand and 6MWT (0.8 and 0.87 respectively).

Conclusions: A telehealth-to-home exercise intervention is feasible for LTR and unsupervised clinical and functional tests can be accurately performed at home by participants.
Cardiopulmonary fitness and cardiac function 12-months following anthracycline-based chemotherapy with or without concurrent exercise training

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Introduction: Anthracycline chemotherapy (AC), is a common breast cancer treatment that is associated with reductions in cardiac function and aerobic fitness (VO₂peak). Exercise training during AC may be useful to attenuate these effects, however it is unclear whether the benefits of exercise training are sustained months after completing AC. This study aims to investigate the changes in VO₂peak and cardiac function at 12 months following AC with/without concurrent exercise training, compared to pre-AC values.

Methods: 28 women with breast cancer who had chosen to undergo aerobic and resistance training twice per week during AC (ET; n=14) or usual care during AC (UC; n=14) were asked to return for an evaluation of fitness and cardiac function 12 months from AC completion. Outcomes include VO₂peak, and stroke volume (SV) measured at rest, and during low, moderate and high-intensity cycling using cardiac magnetic resonance imaging. To date, 8/28 women have completed follow-up evaluation (UC: n=4; ET: n=4), with data for the remaining participants to be included at the conference. As data collection is ongoing, no formal statistical analysis has been undertaken.

Results: Initial observations indicate VO₂peak (mL/kg/min) measured at 12 months following AC remains below pre-AC values in those who underwent UC (Pre AC=18.9 ± 2.2; 12m=15.6 ± 3.2) or ET during AC (Pre AC=29.8 ± 8.9; 12m=26.6 ± 7.0). These reductions coincide with a change in SV (ΔSV) from rest to high intensity cycling at 12 months that is lower compared to pre-AC values in the UC (Pre AC=16.0 ± 9.0mLs; 12m=11.2 ± 4.7mLs) and ET groups (Pre AC=22.0 ± 14.3 mLs; 12m=14.3 ± 5.7mLs).

Conclusion: AC is associated with a persistent reduction in VO₂peak that appears to be mediated by reduced cardiac function. Exercise training during AC is not sufficient to return VO₂peak or cardiac function to pre-AC levels. Longer duration exercise programs may be needed to restore fitness and cardiac function to pre-AC levels.

Immune Response in Women During Exercise in the Heat: A Spotlight on Oral Contraception

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Objectives: This study compared the immune and stress response of oral contraceptive users (WomenOC; n = 9) to normally-menstruating women (WomenNM; n = 9) at rest and during exercise in temperate (TEMP; 22°C) and hot (HEAT; 35°C) conditions.

Methods: Participants performed a 3-stage cycling trial in each condition at 90% (Stage 1), 135% (Stage 2), and 180% (Stage 3) of lactate threshold 1 (total = 52.5 min). C-reactive protein (CRP) and immune cell counts were measured at rest, and serum cytokines (IL-1β, IL-1RA, IL-6, IL-8, IL-10, and TNF-α) and salivary cortisol were evaluated before and after exercise in both the TEMP and HEAT conditions.

Results: There were no differences in resting immune cell counts between groups, nor any differences in cortisol or any of the pro- or anti-inflammatory cytokines measured at rest or after completion of the exercise trials (P > 0.05). However, a trend for a higher resting CRP concentration was observed in WomenOC relative to WomenNM (1.102 ± 1.182 and 0.326 ± 0.228, respectively, p = 0.07).

Conclusions: In the main, the results obtained in the current study indicate similar immunoendocrine function in WomenOC and WomenNM both at rest and after exercise in temperate and hot environments.

Keywords: cytokines; cortisol; C-reactive protein; core temperature; ovarian hormones.
Audit of Strength Clinic training program at the UNSW Medicine Lifestyle Clinic

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Introduction & Aims: The Strength Clinic is a community-based 12 week Progressive Resistance Training program. Clients with chronic health conditions are advised to attend 2-3 sessions/week as per evidence-based practice. A retrospective audit was conducted to evaluate the program.

Methods: Clients commencing between July 2014 - December 2016 were selected for the audit and informed consent was obtained. Demographic data, attendance and outcome measures (BMI, waist circumference, resting heart rate and blood pressure (BP), 10RM supported row and squat, 6 min walk test, 5 x sit-to-stand and single leg balance (SLB)) were analysed.

Results: All clients (n=177/433 consenting; 111 females; mean age 66 (12; SD) years; BMI 27.8 (6.2)) presented with a minimum of 2 chronic health conditions, including musculoskeletal (33%), cardiovascular (20%), cancer (19%), metabolic (15%), neurological (10%), and mental illness (3%) disorders. 10RM reassessments were performed in 69% (SQUAT) 71% (SUP ROW) of clients, with a mean increase of 24% (p<0.001). BP decreased from 131/74 to 124/71 mmHg (p<0.001) and SLB improved by 25% (p<0.05). No changes in body composition or other function measures were observed, although not all assessments were completed post-treatment. Clients attended a mean of 16 (8) sessions over 9 (3) weeks, attending 1.2 (0.6) sessions/week. On average clients completed the program in 15 (5) weeks.

Conclusion: The current audit provides valuable data on clients attending the Strength Clinic. In general, the clients improved strength, balance and BP following the program. However, no meaningful changes in other measures were observed, which may be partly due to low compliance. Focusing on the barriers to client attendance and clinician compliance with re-assessment protocols will be the next step to understanding whether strength training has greater positive benefits for community dwelling clients with chronic health conditions.

12 Month Follow-Up of Patients who Completed an Isolated, Targeted and Progressive Resistance Device Based Exercise Rehabilitation Program for Chronic Back and Neck Pain - A Pilot Study

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Introduction and Aims: Back pain (BP) and neck pain (NP) are leading causes of disability (Hoy et al, 2012), characterised by high recurrence rates over 12 months (Hoy et al, 2010). Exercise treatment for chronic BP and NP has been subject to rigorous review. Despite the abundance of evidence supporting exercise treatment of BP and NP, there is a lack of research which has reviewed whether the gains achieved during exercise rehabilitation were maintained 12 month post treatment. This study aims to evaluate whether the success achieved in an isolated, targeted and progressive resistance device based exercise treatment are maintained at 12 months post treatment.

Methods: Clients who presented to a Melbourne Healthy Back Solutions clinic with chronic BP and NP and who completed a minimum of 24 treatments were invited to undergo a 12 month review. A total of 37 subjects (21 females, 16 males) completed an Oswestry Disability Index (ODI), mobility and isometric strength testing of the Lumbar/Thoracic and Cervical Spines. Quantification of spinal mobility and strength was completed using TGA registered medical grade exercise rehabilitation devices which isolate the spinal musculature.

Results: At 12 months post treatment all subjects maintained their previously achieved mobility and strength levels. Importantly the 10 males and 13 females (62%) who achieved a normal level of strength in the initial program, maintained these values and at 12 months showed no increase in ODI scores. At the 12 month post program follow up, the 6 males and 8 females (38%) who failed to achieve normative ranges of strength during the initial treatment reported an increase in ODI.
**Conclusion:** The results demonstrate that clients who completed an isolated, targeted, and progressive exercise rehabilitation program, and achieved normative ranges for strength maintained their reduction in symptoms and improved function at the 12 month follow-up.
Responding for life: Current health and fitness status of Australian paramedics

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Introduction & Aims: Paramedics are among the most frequently injured health professionals in Australia. Awkward and heavy manual handling tasks are some of the primary causes of work-related paramedic injuries. There is scant data on the health and fitness profiles of Australian paramedics, and despite its importance, how to monitor and facilitate fitness levels to reduce injury risk.

Methods: A group of regional and rural Australian paramedics (n=109; 59 male; mean±SD 37.0±10.2 years; BMI 28.3±5.4 kg/m²) underwent health and fitness screening. Measures included resting blood pressure (BP; Omron HEM-7322, Japan), body composition (body fat % measured by bioelectrical impedance; Inner Scan V, Tanita, Japan), upper and lower body and core muscular strength (maximum push-ups (modified for females), single-leg (SL) wall squat (total of left and right; sec) and prone plank hold; sec) and flexibility (sit and reach; cm). Outcomes were compared to ACSM normative data and between sex using multivariate ANOVA.

Results: Compared to females, males had higher BP (p<0.01) (mean±SD): 136±11/85±8mmHg vs. 123±13/80±7mmHg (both pre-hypertensive); less relative body fat (p<0.001): 23.7±6.5% (poor) vs. 34.7±8.3% (very poor); greater upper body strength (p<0.05; push-ups): 22±12 (very good) vs. 16±12 (good); similar lower body strength (SL wall squat): 39.7±22.7sec vs. 35.2±30.3sec (both below average); similar core strength (prone plank hold): 90±43.5sec vs. 74.7±41sec (both below average); and less lower body flexibility (p<0.001; sit and reach): 20.8±9.7cm vs. 27.2±9.6cm (both fair).

Conclusion: Both male and female regional and rural Australian paramedics may be at an increased risk of work-related musculoskeletal injuries due to a lack of core strength and lower body strength and flexibility. Furthermore, cardiometabolic disease risk may be elevated in this population as a consequence of high body fat and pre-hypertensive BP levels.
Optimising Care: a pre-post trial evaluating the feasibility, safety and preliminary efficacy of a tailored exercise and dietary intervention for women with metastatic breast cancer

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Introduction & aims Women with metastatic breast cancer (MBC) have poor quality of life, physical well-being and function. Optimising length and quality of survival are the primary goals of care. A healthy body weight, increased physical activity and healthy diet are associated with improved quality of life and survival in early-stage breast cancer. However, the importance of these interventions to the quality of survivorship in MBC is unclear.

Methods Optimising Care is a single-arm trial that will evaluate feasibility, safety and preliminary efficacy of a tailored exercise and dietary intervention in women with MBC (n=60), diagnosed in the previous 5 years, ECOG status 0-2, and anticipated survival ≥12 months. The 16-week intervention focuses on 1) adequate protein intake and overall dietary quality (8 dietitian sessions) and 2) individualised prescription of aerobic and resistance exercises at moderate-intensity, accumulating ≥150 minutes per week (8 exercise physiology sessions). Participants are assessed at baseline, 16-weeks and 6-month follow up. Primary outcomes include 1) feasibility: retention, adherence and compliance; deemed acceptable when ≥60%; 2) safety: intervention will be considered safe if intervention-related CTC-adverse events of grade 3-5 are ≤10%. Secondary outcomes include changes in quality of life (FACTB+4, EORTCQLQ), lean mass (DXA), fatigue (FACIT-F), function (6-minute walk test, balance, strength), nutritional status (PG-SGA), dietary intake, mood (HADS) and activity (actigraphy). Changes in secondary outcomes over time will be analysed using linear mixed models and the relationship between outcomes, diagnosis, treatment, and intervention compliance will be explored.

Conclusion Ethics approval has been granted with recruitment to start in January 2018. This trial will provide the first evidence of a combined exercise and dietary intervention in women with MBC, which may have important synergistic effects to optimise quality of life.
The effect of endurance exercise on the expression of SIRT4 and associated proteins in the liver and insulin sensitivity of insulin resistance rats

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Introduction & Aims: Sirtuin 4 (SIRT4) has been reported to regulate insulin secretion and lipid metabolism, but its association with insulin resistance (IR) and the effect of exercise remain undefined. SIRT4 has been shown to decrease insulin level, upregulate insulin degrading enzyme (IDE) and inhibit glutamate dehydrogenase (GDH). The aim of this study was to evaluate the effect of endurance exercise on the expression of SIRT4, GDH and IDE proteins in the liver in relation to IR.

Methods: Thirty-two male Wistar rats were randomly allocated into four groups (n=8 each): normal control (NC); normal exercise (NE); IR control (IRC); and IR exercise (IRE). The IRC and IRE groups were fed on high-fat diet for 5 wk, and IR status was confirmed by euglycaemic clamp test. While continuing with their normal or high-fat diet, the NE and IRE were trained on a motorized wheel at 20m/min, 45 min/d, 5 d/wk for six weeks. The blood and liver samples were obtained 24 hours after the last exercise session. The expression of the targeted proteins was determined by western blot. Insulin sensitivity was measured by euglycaemic clamp test again.

Results: Compared with NC group, by two-way ANOVA, IRC group showed reduced SIRT4 and higher IDE expression (P<0.05). The NE group showed a lower expression of SIRT4 than NC group (P<0.05). Compared with IRC group, IRE group had decreased levels of SIRT4 and IDE (P<0.05), but higher level of GDH (P<0.05). Insulin sensitivity improved in both NE and IRE groups (P<0.05).

Conclusion: Both IR and endurance exercise can induce a significant decline in SIRT4 expression in the liver, which might be manifested via different mechanisms, further studies are required to explain its roles in the pathology of insulin resistance and exercise metabolism. Endurance exercise changed the levels of IDE and GDH in the liver of IRE group that might contribute to exercise-induced increase in insulin sensitivity.

The effects of exercise on vascular and cardiac structure and function, and autonomic nervous system function, in cancer patients and survivors: A systematic review

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Introduction & Aims: Cardiovascular disease is the leading cause of non-malignant late morbidity and mortality in cancer survivors. Exercise has been shown to improve sub-acute measures of cardiovascular disease risk that precede cardiac dysfunction in non-oncological populations. This review aimed to determine the effect of exercise on sub-acute markers of vascular structure and function, autonomic nervous system (ANS) function, as well as cardiac structure and function, in cancer patients and survivors.

Methods: Seven electronic databases were searched to identify randomised controlled, comparative, and cohort studies. Included studies implemented any exercise intervention and assessed the vasculature, ANS or cardiac structure or function in individuals with a histologically-confirmed diagnosis of cancer.

Results: Of the 5,415 studies, 11 met the inclusion criteria. Measures of vascular structure and function, and ANS function, were significantly improved (P<0.05) in cancer survivors who undertook aerobic-only, combined aerobic and resistance, and exercise counselling interventions. Interventions of longer duration (>3 months) and a more vigorous intensity elicited greater improvements. Significant improvements were not observed for interventions in cancer patients who were concurrently undertaking cancer therapies, or who had concluded treatment <1 month prior. No significant improvements (P>0.05) in cardiac structure or function were observed for any exercise intervention.

Conclusion: This review suggests that exercise is effective in improving select sub-acute markers of vascular, but not cardiac, disease risk in cancer survivors. However, no significant effect of exercise was observed in cancer patients currently undergoing, or recently completing, treatment. Long-term, vigorous-intensity exercise is recommended for cancer survivors to reduce their vascular disease risk, with further research required in the acute-treatment phase.
Correlates of sedentary behavior among university students: A systematic review

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Introduction & aims: Evidence shows that high levels of sedentary behaviour (SB) are associated with negative health-related outcomes. University students are a population sub-group that spend a large proportion of their day engaged in SB. However, there is limited evidence on the key factors influencing SB among university students. The aim of this systematic review is to identify the individual, social, environmental, and policy-related correlates of SB among university students.

Methods: Records from 12 electronic databases and reference lists of included studies were screened by two reviewers. Inclusion criteria included: (i) peer-reviewed articles written in English, Spanish, or French; (ii) studies that included undergraduate or postgraduate university students; (iii) studies reporting on the association between SB and at least one correlate. PROSPERO protocol available (CRD42017074198).

Results: Of the 4819 studies initially identified, 127 met the inclusion criteria. Most studies were cross-sectional (90%). The primarily measure of SB was self-reported screen time (72%), followed by total sitting time (26%). A few number of factors were sufficiently investigated and showed consistent association with SB. Screen time was negatively associated with academic performance and positively associated with different health-related factors (i.e., low back pain and musculoskeletal symptoms). Limited studies reported on environmental or social correlates.

Conclusion: This review suggests a number of different correlates of SB in university students. Overall, most were individual non-modifiable factors. Although these may assist in determining the sub-groups at risk of being sedentary, further evidence including environmental and other modifiable correlates is required to inform future intervention development. In addition, most studies were cross-sectional, thus restricting causal inference. Longitudinal studies are needed to enable the identification of determinants.

HEART Online: Helping clinicians apply research into clinical practice

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Background: Clinicians often find it difficult to find up-to-date, evidence-based information for heart failure management and cardiac disease prevention and rehabilitation due to time and resource constraints and dispersed information. This issue was particularly raised by Exercise Physiologists.

Purpose: Heart Education Assessment Rehabilitation Toolkit (HEART) Online (WWW.HEARTOnline.org.au) was developed by clinicians for clinicians to help apply research into practice by providing tools for multidisciplinary team members to enable the assessment, planning, implementation and evaluation of care for patients. Tools includes guidelines, templates, protocols, calculators, patient resources and videos.

Methods: HEART Online was developed by an expert content panel of clinicians, trainers and academics who generously give their time and intellectual property to ensure materials remains relevant to clinical practice. The site is governed by the Heart Foundation and supported by Queensland Government. It was launched in May 2013 and has since been continuously modified based upon periodic targeted surveys, expert reviewer feedback and ongoing data from Google Analytics and “contact us”.

Results: HEART Online has an average of 4,000 visits per month; 70% new visitors; 30% returning across Australia and internationally. Feedback has resulted in: new pages on medications for acute coronary syndromes; sleep and heart failure; implantable devices; and revised sections on sexual activity and smoking. The 33 downloadable resources (e.g. clinical forms, letters, algorithms, patient handouts) have been revised to improve presentation and ease of reading.

Conclusion: HEART Online has been developed by lead Australian clinicians and academics and has the potential to improve standards of evidence-based practice in cardiovascular care. The popularity of the site suggests it is meeting an unmet need and is responsive to current and future needs of clinical practice.
Elliptical trainer rehabilitation (weight supported) provides functional improvements in adults with limited mobility

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Aim: To provide and compare effects of low – moderate intensity exercise for “low-functioning” adults attending a private physiotherapy practice with complex and chronic disease, utilizing a supported weight bearing elliptical trainer device from baseline to 6 months of treatment.

Design and Method: Inclusions were a cross section of 5 clients attending rehabilitation to improve functional capacity. Patients had a history of reduced mobility secondary to a neurological condition. Clients’ baseline compared to post rehabilitation data for measures of gait speed (10 m walk test) and Visual Analogue Scale for Fatigue (VAS-F). Post treatment data was collected at baseline and 6 months. Subjectively clients are encouraged to work towards BORG RPE 13 while using elliptical trainer.

Results: Comparison of baseline to 6-month measures showed the average improvement was -8.7 (sd 8.05) seconds and 0.08 (sd 0.09) m/s for gait speed. Subjective results for VAS-F demonstrated a reduction in fatigue levels.

Conclusions: These results support the novel use of a weight bearing elliptical trainer device to enhance rehabilitation in this client group. Positive changes have been observed comparing baseline to 6 month data of increased gait speed and of subjectively reduced fatigue in this small cohort.

Clinical Implications: Inclusion of supported weight elliptical trainer may provide a novel approach to rehabilitation for adults with limited mobility. This may provide an opportunity to meet recommended guidelines for physical activity following a stroke, while potentially providing an alternative to the current rehabilitation model.

The physical literacy of children with behavioural and emotional disorders: A scoping review

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Introduction & Aims: The prevalence of mental health disorders (MHD) in children is increasing, and these children are less likely to be active. To improve long term health outcomes for children with MHD, regular physical activity (PA) participation is essential. Physical literacy, comprising physical competence, PA-related knowledge & understanding, and perceptions of motivation & confidence, may be one construct through which we can better understand the PA levels of children with MHD. The purpose of this scoping review was to establish the physical literacy levels of children with MHD.

Method: Database searches of Medline, Scopus, Embase, PsycINFO and Sportdiscus were conducted for publications from 1985 to September 2017. Broad search terms included diagnosis; PA; physical competence; confidence; motivation; knowledge & understanding. All studies that examined the individual components of physical literacy of children aged 6-12 with behavioural and emotional disorders (F90-98, ICD-10) were included. Articles were independently reviewed and quality assessed by two authors.

Results: The search identified 15,454 articles. Following title, abstract and full text review, 52 articles were included. Physical competence was addressed in 44 articles, 28 demonstrating lower physical competence than typically developing children. Six articles focused on daily behaviour with four demonstrating lower PA levels in children with MHD. Motivation & confidence (n=2) and knowledge & understanding (n=1) were lower in children with MHD. Majority of studies (n=37) were conducted on children with ADHD.

Conclusion: To date, investigators have focused predominantly on physical competence, in particular in children with ADHD. To address and improve the PA levels of children with emotional and behavioural MHD, attention should be directed toward furthering knowledge of the psychological (motivation & confidence) and knowledge-related aspects of physical literacy among these children.
A systematic review and meta-analysis of the effect of lifestyle interventions on adiposity, lean body mass and glycaemic outcomes

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Introduction Beneficial change in body composition rather than weight loss, is an important goal of lifestyle interventions. Sustainable weight loss is difficult, and adiposity and lean body mass associate more strongly than body weight with cardio-metabolic disease risk factors, such as insulin resistance. The individual effects of diet and exercise on these outcomes is unclear.

Aim To examine the effect of dietary and exercise interventions on change in body adiposity, lean body mass and glycaemic outcomes via systematic review and meta-analysis of randomised controlled trials.

Methods A database search was performed in MEDLINE and PubMed to September 2017. Eligible trials included exercise or dietary interventions of ≥ 4 weeks that reported total body fat mass (FM), total lean body mass (LBM) and glycaemic outcomes: plasma glucose (FPG) or glycated haemoglobin (HbA1c) in overweight or obese adults.

Results Of the 11,172 articles searched, 82 were eligible and 59 involving exercise (n=50) or dietary (n=9) interventions were included for meta-analyses. Studies involving a total of 2,481 participants were pooled (1,282 females, 403 not reported), with mean age of 51.0 years and BMI of 30.1 kg/m². There was a significant pooled effect size (ES) for exercise interventions versus non-exercise control for improvement in FPG (ES=0.42; 95% CI: -0.54 to -0.29; P<0.01), FM (ES=0.32; -0.44 to -0.20; P<0.01), and LBM (ES=0.24; 0.15 to 0.33; P<0.01), but not for HbA1c (ES=0.56; -1.24 to 0.11; P=0.10; n=3). When compared with control, dietary interventions reduced FM (ES=0.59; -0.94 to -0.24; P<0.01), but not FPG (ES=0.17; -0.37 to 0.02; P=0.08), and LBM tended to decrease (ES=0.19; -0.01 to 0.38; P=0.6).

Conclusion Diet and exercise interventions alone reduce total body fat mass. Exercise interventions also increase lean body mass and improve fasting plasma glucose, but the effect of dietary intervention alone on these is less clear.

Are five sessions with an Accredited Exercise Physiologist under a Medicare Chronic Disease Management Plan enough for women with Stage II+ breast cancer? Results from a randomised, controlled trial

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Introduction: It is unclear if the current Chronic Disease Management Plan, which allows 5 Medicare-funded sessions with an Accredited Exercise Physiologist (AEP) per year, is sufficient to achieve clinically relevant changes in health outcomes for women with breast cancer. The SAFE trial was a randomised, controlled trial that evaluated the effect of a 12-week exercise intervention comparing 5 versus 20 supervised sessions with an AEP in women with stage II+ breast cancer.

Methods: Sixty (n=60) physically inactive women with stage II+ breast cancer who were currently undergoing, or completed treatment were randomised to a 5 (n=30) or 20 supervised AEP session (n=30) group. All participants were prescribed 150 minutes per week of moderate-intensity, aerobic and resistance exercise for 12 weeks, with the prescription involving behaviour change counselling. Outcomes of interests were aerobic fitness (6-minute walk), upper-body strength (YMCA bench press), lower-body strength (30 second sit-to-stand), balance (single-leg stand) and quality of life (self-report questionnaire).

Results: At 12 weeks, both groups experienced significant (p<0.05) improvements in fitness, and upper- and lower-body strength, but no change in balance. Improvements were greater in the 20 session compared with the 5 AEP session group (mean change, 6-minute walk distance: 71.5 metres vs. 53.8 metres; YMCA bench press: 14 vs. 5 repetitions; 30 second sit-to-stand: 4 vs. 2 repetitions respectively, p<0.05). Quality of life outcomes also displayed similar trends in favour of the 20 AEP group.

Conclusion: These findings indicate the number of Medicare-funded visits to an AEP (5 visits) is sufficient to achieve clinically relevant improvements in health outcomes among women with stage II+ breast cancer. However, more frequent supervised visits
sessions with an AEP (20 visits) leads to greater benefit. These findings support the need for regular AEP supervision during and following breast cancer treatment.

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Effect of aerobic exercise with diet on selected blood parameters of male adults with type 2 diabetes mellitus

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Introduction & Aims: Studies show that short-term aerobic exercise with diet improves glycemic control and cardiovascular health of patients with type 2 diabetes mellitus (T2DM). Such a study has not been conducted with a diet designed for Saudi residents. The aim was to determine the effect of a 12-week program consisting of aerobic exercise and diet made for Saudi residents on selected blood parameters of male adults with T2DM.

Methods: Twenty patients (mean age (SD) = 41.2 (9.4)) from the Eastern Province of Saudi Arabia were distributed equally into the intervention and control groups. This was done after excluding patients with chronic diseases, or those who could not come to the study location. The intervention group went through 50-minute exercise sessions (40-90% intensity), three times a week for 12 weeks, and were provided diet recommendations. The control group received no intervention. Body mass, body mass index (BMI), resting heart rate, blood pressure, blood lipids, fasting blood glucose and HbA1c were measured before and after the program. Shapiro-Wilk test was performed before analyzing the data using parametric or non-parametric tests. Alpha levels were set at 0.05. Cohen d was used to determine the effect size.

Results: There were improvements from pre to post in the intervention group in all parameters except fasting blood glucose and high density lipoprotein. Despite these improvements, there were significant differences between the groups only in the resting heart rate, diastolic blood pressure, and total cholesterol (p≤0.05 and Cohen d≥0.5).

Conclusion: The 12 weeks aerobic exercise with diet program improved several blood parameter of the patients.

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Assessment of selected health-related fitness components of male adolescents of King Fahd University Schools

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Introduction & Aims: Health-related fitness assessments are able to give a general view on a population’s health. Health-related fitness data for adolescents in Saudi Arabia are not available. The aim was to assess selected health-related fitness components of adolescent boys of King Fahd University Schools.

Method: There were 350 children (14-17 years) who participated in the study. The following health-related fitness parameters were assessed: body composition determined by measuring the body mass index (BMI), explosive strength using standing long jump, trunk flexibility using sit and reach, and abdominal muscle endurance using 60-second sit ups. The results from each age were classified using different norms so as to obtain the number of participants in the healthy fitness zone.

Results: A total of 328 children had complete data (mean age (SD) = 15.59 (1.43) years). The following number of participants were in the healthy fitness zone: 263 for BMI (80.18%), 161 for explosive strength (49.09%), 296 for trunk flexibility (90.24%) and 79 for abdominal muscle endurance (24.09%).

Conclusion: Though most of the students had a healthy BMI and good explosive strength, more than three-quarter of the adolescents had low muscular endurance. Efforts are needed to improve this fitness parameter as it is needed for daily activities.
Upper Respiratory Infection in Different Tiers of Rugby Union

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Rugby union is an international sport with high impacts and training load which could predispose players to increased illness rates. The aim of the study is to characterise the incidence and duration of upper respiratory illness in school boy (three tiers), amateur and professional rugby players. Participants were asked to complete a questionnaire twice a week for the duration of the active playing season. The questionnaire investigated level of activity, wellbeing and respiratory-related symptoms. Upper respiratory illness incidence per 1000 non-sick days (± SD) for the three tiers of school boy, amateur and professional teams were 11.1 ± 9.7, 11.0 ± 17.8, 22.4 ± 30.9, 12.2 ± 21.8 and 12.4 ± 16.8 respectively. Additionally, the duration of illness was 62.3 ± 116.1, 59.6 ± 183.2, 552.1 ± 1138.8, 64.3 ± 173.9, 32.6 ± 59.7 days per 1000 non-sick days respectively. With the general population averaging two to three respiratory illnesses per year, researchers conclude that participation in rugby across all tiers results in an increased risk of upper respiratory illness. Furthermore, the highest incidence occurs in the highest echelon of school boy rugby and requires further robust investigation.

Implementing a tailored text-messaging intervention to increase physical activity and reduce sedentary behaviour in cancer survivors: A process evaluation

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Background: Whilst exercise is recognised as an effective adjuvant treatment in oncology care, evidence suggests participants’ physical activity returns to baseline following completion of supervised sessions. Whether providing extended contact via an individually-tailored text-message intervention is feasible and well received remains to be elucidated.

Aim: To describe a process evaluation of a tailored text-messaging intervention delivered in conjunction with an exercise rehabilitation clinic for cancer patients and survivors.

Methods: Twenty cancer patients and survivors commencing a four-week exercise rehabilitation clinic were invited to participate in this 12-week tailored, text-message intervention. Retention, adherence and participant satisfaction were evaluated using text logs and a satisfaction survey, respectively. In addition, a focus group (n=5) was conducted to explore participant perspectives of the intervention; data were explored using thematic analysis.

Results: Seventeen (85%) participants mean age 64.5±13.9 years and 7.1±6.3 years since diagnosis completed the 12-week intervention. Participants received 42.4±16.2 text messages over 12 weeks. Of the 85 text messages inviting participant response, 40 (47%) replies were received. Overall satisfaction with the intervention was 4.6±0.5 on a 5-point likert scale. According to focus group data, six key themes were identified including satisfaction with the individualised nature of the intervention and the importance of human contact in the form of text messages.

Conclusion: An individually-tailored text messaging intervention was well received with high retention and satisfaction. A tailored text-messaging intervention is a potentially effective method of extending patient care beyond supervised exercise rehabilitation in cancer patients and survivors.
Exercise as medicine for pancreatic cancer patients: Feasibility and preliminary efficacy

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**Introduction:** Pancreatic cancer is an aggressive cancer that metastasises early, usually detected late, and affects ~2500 Australians each year with a poor 5-year relative survival rate of 6%. Cancer- and treatment-related effects have a profound impact on quality of life (QOL) with patients commonly experiencing an array of adverse effects including substantial weight loss, fatigue, nausea, and psychological distress. In other cancer settings, exercise is an effective countermeasure to a number of these cancer- and treatment-related effects. This study examined the feasibility and preliminary efficacy of exercise in the setting of pancreatic cancer.

**Methods:** 36 patients were invited via their oncologist to take part in a 12-week exercise intervention at a university exercise clinic. Exercise was twice weekly, consisting of aerobic and resistance training. Patients were assessed at baseline, post-intervention and 6-month follow-up. Outcomes assessed included muscle strength, functional performance, body composition, balance and QOL.

**Results:** 20 patients (63.8±13.1 yrs.) undertook the baseline assessment with 11 completing ≥ 80% of training sessions. Attendance for subsequent assessments reduced to 50% (chemotherapy effects, hospitalisation, death) at 12 weeks and 6-month follow-up. At 12 weeks, significant improvements (p<0.05) were observed for leg strength (24%), 6m fast walk (10%) and 400m walk (6%). At 6-month follow-up, significant improvements (p<0.05) remained for leg strength (27%), stair climb (20%), and balance (7%). Lean and fat mass were preserved with no decline in QOL. The program was well tolerated and there were no adverse events.

**Conclusion:** Exercise was well-accepted and safe for pancreatic cancer patients with improvement or preservation of key functional and body composition parameters. As a result, the undertaking of exercise during treatment for pancreatic cancer may assist in improving or preserving physical function, body composition and QOL.

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Targeting fitness over fatness may be more important in increasing health-related post-exercise heart rate recovery in patients with metabolic syndrome

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**Introduction:** Delayed heart rate recovery (HRR) after exercise and reduced resting heart rate variability (HRV), are known risk factors of cardiovascular mortality. Metabolic syndrome (MetS) has also been shown to be associated with a decline in HRR and HRV, proposed to further explain the increased susceptibility of those with this syndrome to cardiovascular events (CVEs). Moreover, central obesity is purported to be the central mediating factor of MetS, yet fit MetS individuals have lower CVEs risk compared to less fit counterparts. To determine the relative importance of targeting fitness or fatness in diminishing CVEs risk in this cohort, the present study investigated the independent associations of cardiorespiratory fitness (CRF) and visceral adipose tissue (VAT) with HRR and HRV.

**Methods:** This cross-sectional study included 77 individuals with MetS. Participants on beta-blockers (n=7) were excluded from the analysis. HRR was defined as the heart rate (HR) decline from the rate at peak exercise during a maximal exercise test (MET) to the rate at one-minute post-exercise cessation. R-R interval recorded for 5 minutes in a supine position was used to derive linear (i.e. SDNN, LF power) and non-linear HRV. CRF and VAT were also measured via MET and DEXA.

**Results:** CRF was positively associated with HRR (r=0.30, p=0.01) and LF power (r=0.29, p=0.01). Multiple regression analysis revealed that CRF was associated with HRR (β=0.35, p=0.047), independent of VAT and other confounding factors including...
age, sex, resting HR, lean mass, MetS severity, and other body fat indices. In contrast, the significant association between CRF and LF power was abolished ($\beta=0.03, p=0.83$) after adjusting for the aforementioned confounding variables. No significant associations were found between CRF and other HRV parameters. VAT was not significantly correlated with HRR or HRV.

**Conclusion:** We provide some evidence that targeting fitness over fatness may be more important in increasing post-exercise HRR in MetS patients.
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Does high intensity interval training facilitate responses to non-invasive brain stimulation? Assessing neural plasticity and cognition

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Introduction and aims: Transcranial direct current stimulation (tDCS) has attracted scientific interest due to its ability to increase neuronal plasticity, and enhance cognitive performance. However, individual’s responses to tDCS are highly variable, with many participants failing to respond. Physical exercise (Ex) may create favourable conditions for adaptive brain plasticity via increased levels of brain derived neurotrophic factor (BDNF) and reduced cortical inhibition. The aim of this study was to determine whether a single bout of high intensity interval training (HIIT) performed prior to stimulation would facilitate the effects of tDCS.

Methods: 23 participants attended 3 sessions in a double-blinded, random, crossover design. The sessions included 1) Ex+tDCS, 2) Ex+sham, and 3) tDCS. 20min of HIIT on a stationary bicycle. Following this, 20min of tDCS (1mA) was applied to the frontal lobe. Outcome measures included a cognitive test battery (reaction time, congruent and incongruent stroop, 2- and 3-back), self-rated mood (Bond-Lader), corticospinal excitability, cortical blood flow, and circulating levels of BDNF (venous blood sample).

Results: Early analysis (n=18) has revealed a reduction in response time during the congruent stroop task following Ex+tDCS condition (mean difference -25.9ms, p=0.02), but not Ex+sham (-6.5ms, p=0.53) or tDCS (-2.4ms, p=0.76) conditions. Response time during incongruent stroop was reduced following Ex+tDCS (-35.5ms, p=0.01) and Ex+sham (-22.8ms, p=0.02), but not tDCS (0.4ms, p=0.81). There were no significant changes in accuracy (all p>0.05). There was an increase in the ‘alertness’ subscale for Ex+tDCS (12.1%, p=0.04) but not Ex+sham (6.4%, p=0.11) or tDCS (3.8%, p=0.24).

Conclusion: Preliminary findings indicate that an acute bout of HIIT may facilitate the effects of brain stimulation in healthy adults. Full results, including analysis of plasma BDNF, corticospinal excitability and blood flow will be available in 2018.

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Yoga and stress-related physiological measures: A meta-analysis

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Introduction and Aims: Practices that include yoga asanas for the management of stress are increasingly popular; however, the neurobiological effects of these practices on stress reactivity are not well understood. Many studies investigating the effects of such practices fail to include an active control group. Given the frequency with which people are selecting such interventions as a form of self-management, it is important to determine their effectiveness. Thus, this review investigates the effects of practices that include yoga asanas, compared to an active control, on physiological markers of stress.

Methods: A meta-analysis of randomised controlled trials published in English compared practices that included yoga asanas to an active control on stress-related physiological measures. MEDLINE, AMED, CINAHL, PsycINFO, SocINDEX, PubMed and Scopus were searched. Randomised controlled trials were included if they assessed at least one of the following outcomes: heart rate, blood pressure, heart rate variability, mean arterial pressure, C-reactive protein, interleukins or cortisol. Meta-analysis was undertaken using Comprehensive Meta-Analysis Software Version 3. Subgroup analysis was conducted for different yoga and control group types, different populations, length of intervention, and method of data analysis.

Results: Forty two studies were included in the meta-analysis. Interventions that included yoga asanas were associated with reduced evening cortisol, waking cortisol, ambulatory systolic blood pressure, resting heart rate, high frequency heart rate variability, fasting blood glucose, cholesterol and low density lipoprotein, compared to active control. However, the reported interventions were heterogeneous.

Conclusions: Practices that include yoga asanas need to be associated with improved regulation of the sympathetic nervous system and hypothalamic-pituitary-adrenal system in various populations.
How important is exercise supervision for those with or at-risk of lymphoedema to lymphoedema outcomes? Results from a randomised, controlled trial

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Introduction: The SAFE trial was a 12-week randomised, controlled trial that compared high- versus low-level supervision throughout a 12-week exercise intervention on lymphoedema outcomes for those with or at-risk of unilateral breast cancer-related lymphoedema (BCRL).

Methods: Sixty (n=60) participants with stage II+ breast cancer who were currently undergoing, or completed treatment were randomly allocated to either a high- (n=30) or low-supervision (n=30) 12-week exercise intervention. All consenting women (n=60) participated in 150+ minutes of moderate-intensity, aerobic- and resistance-based exercise for 12 weeks. The high-supervision group (n=30) received 20 sessions with an Accredited Exercise Physiologist, while those randomised to the low-supervision group (n=30) received 5 sessions. Lymphoedema was measured using bioimpedance spectroscopy (L-Dex) and self-report (results available at conference). L-Dex scores >10 and change scores >9 indicate presence of lymphoedema and fluctuations exceeding normative change, respectively.

Results: There was no clinically relevant difference in L-Dex scores within groups over time or between groups (mean L-Dex change scores for high- versus low-supervision: +0.4 vs +2.3).

Conclusion: These preliminary findings support the notion that women with or at-risk of BCRL can participate in exercise without adversely influencing lymphoedema outcomes, even with low levels of clinical supervision.

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Sedentary time, physical activity and cardiorespiratory fitness in patients with advanced liver disease awaiting liver transplantation

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Introduction & Aims: Impaired cardiorespiratory fitness, measured as the ventilatory threshold (VT), has been associated with complications before and after liver transplantation. Sedentary behaviour has been inversely related to cardiorespiratory fitness in the general population, but remains unexplored in advanced liver disease. Our aim was to determine if sedentary time was independently associated with VT in patients awaiting liver transplantation. We also investigated the differences in habitual activity between patients with and without hepatocellular carcinoma (HCC).

Methods: Twenty-three adults awaiting liver transplantation (age: 48 [41.0–60.0], 82.6% male, 43.4% HCC) participated in this study. VT was determined via a cardiopulmonary exercise test. Habitual physical activity (sedentary, light, moderate-to-vigorous physical activity) was assessed over seven days using a GENActiv tri-axial accelerometer. Activity intensity (in metabolic equivalents [METs]) was defined as follows: sedentary time (<1.5 METs), light (1.5–3.99 METs), moderate (4–6.99 METs) and vigorous (≥7 METs).

Results: Sedentary time was negatively associated with the VT (beta-coefficient = -0.46, P=0.03) and independent of light and moderate-to-vigorous physical activities, and other confounding variables (age, use of beta-blocker medication, model for end-stage liver disease score). Individuals with HCC undertook more light (P<0.01) and moderate-to-vigorous physical activities (P=0.01), with less sedentary time (P=0.01), than those without HCC.

Conclusion: Sedentary time is independently and negatively associated with the VT in this cohort. Therefore, the assessment of sedentary time may offer utility as a precursor toward impaired VT in this population, providing valuable clinical insight into pre- and post-operative success.
Effects of a four-week exercise training intervention on cardiac autonomic function in patients with advanced liver disease

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Introduction & Aims: Patients with advanced liver disease (ALD) often present with impaired cardiac autonomic function (CAF). Impaired CAF, measured via heart rate variability (HRV), has been associated with poor pre-liver transplant prognosis. Exercise training can improve CAF; however, whether exercise training can improve CAF in patients with ALD is unknown. We investigated the efficacy of a four-week exercise intervention on CAF in patients with ALD.

Methods: Twenty-one patients with ALD were randomised to either 60 mins of combined moderate-intensity aerobic (cycle ergometer, 55-80% heart rate peak) and resistance (8-10 exercises, 11-13/20 rating of perceived exertion) training performed three times weekly, or usual care. Twelve patients (48.3±14.2 years, 92% male, model for end-stage liver disease score: 12 [10.0-16.8], 58% hepatocellular carcinoma) who were not taking beta-blockers were included in the analysis. R-R intervals were recorded during supine rest for 5 min pre- and post-intervention to derive linear (SDNN, RMSSD, HF and LF power, LF/HF ratio) and non-linear (SD1, SD2, SampEn) HRV indices. ANCOVA examined between-group differences. Within- and between-group effect sizes were calculated to determine the magnitude of change.

Results: There were no significant between-group improvements for all HRV indices. Small-to-medium group by time interaction effects were observed for HF power (eta squared=0.02) and SampEn (eta squared=0.09), with exercise showing a greater magnitude of improvement compared to usual care. Positive small-to-medium effect sizes were observed in the exercise training group for increases in HF power (ES=0.39), LF/HF ratio (ES=0.47) and SampEn (ES=0.22). Only the LF/HF ratio showed a positive small-to-medium effect size (ES=0.42) in the usual care group.

Conclusions: Compared to usual care, four weeks of moderate-intensity aerobic and resistance training does not significantly improve CAF indices in patients with advanced liver disease.

Comparison of Muscle Activity Levels during Participation in Three Group Exercise Classes

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Introduction & Aims: Average heart rate and total exercise energy expenditure are higher for group indoor cycling (RIDE) and group step aerobics classes (STEP) compared with group resistance exercise classes (PUMP) [1]. However, differences between classes in muscle activation levels are unknown. This study compared core stabiliser, lower limb, and upper limb muscle activation between RIDE, STEP, and PUMP group exercise classes.

Methods: Ten subjects completed each exercise class with surface EMG electrodes placed over sixteen muscles: Trapezius, Deltoid, Biceps Brachii, Triceps Brachii, Flexor Carpi Radialis, Pectoralis Major, Latisimus Dorsi, Erector Spinae, Rectus Abdominis, External Oblique, Gluteus Maximus, Biceps Femoris, Rectus Femoris, Vastus Lateralis, Tibialis Anterior and Gastrocnemius. EMG root-mean-square (RMS) was calculated and normalised against a series of maximal voluntary isometric contractions (MVIC). Total RMS activity for each muscle and class was determined and the proportion of class duration where muscles were active was determined as the sum of RMS signals that attained a minimum amplitude of 10% of the respective MVIC value.

Results: STEP and PUMP had greater total core muscle activity compared with PUMP (p<0.05), PUMP had greater total upper limb muscle activity compared with STEP and RIDE (p<0.05), and STEP had greater total lower limb muscle activity compared with RIDE and PUMP (p<0.05). Lower limb and core muscles were active for a greater proportion of class duration in STEP compared with PUMP and RIDE (p<0.05).
Conclusions: These data demonstrate major differences in muscle activation patterns between the RIDE, STEP, and PUMP group exercise classes. Such data may have implication for the specificity of exercise training and assist group exercise participants select classes that best activate target muscles during workouts.
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Central Neuromuscular Manifestations Associated With A Sustained Maximal Voluntary Contraction Between Cancer Survivors with Fatigue Symptoms and Healthy Women

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Introduction & Aims: Acute neuromuscular manifestations associated with a sustained maximal voluntary isometric contraction (MVC) of the elbow flexors were compared between cancer survivors with persistent fatigue symptoms and healthy women.

Methods: Nine disease-free, post-treatment survivors (PTCa; 7 breast, 2 ovarian), aged 43-66 years and 17 healthy women (HW), aged 41-62 years were included. A 2-min MVC of the right elbow flexors at 90° shoulder and elbow flexion was performed. Blood lactate (La-) and resting muscle compound potentials (Mmax) from the biceps brachii (BB) were assessed before (Pre) and after (Post) MVC; while maximal voluntary torque (MVT), voluntary surface electromyography (EMG) from the BB, and indices of corticomotor excitability using transcranial magnetic stimulation (TMS) were assessed Pre, Post and during MVC.

Results: No Pre differences were observed between groups in any of the variables. MVT progressively decreased during MVC so that values Post were ~60% of those observed Pre. La- was higher Post in both groups. EMG root-mean-square (rms) normalised to Mmax and EMG median frequency progressively decreased over time during MVC; however, values immediately Post were similar to Pre in both groups. Normalised superimposed twitch responses to TMS, showed that the level of torque progressively decreased over time during MVC; however, the level of corticomotor activation Post were similar to Pre values in both groups. However, the duration of the cortical silent period progressively increased during MVC and was longer Post in the PTCa group.

Conclusion: Despite increased self-reported fatigue in the PTCa the contribution of central mechanisms in the progressive development of fatigue during MVC was highly comparable to that observed in HW. This suggests that the pathophysiological mechanisms contributing to the increased self-reported fatigue may be more related to alterations in perception rather than impaired sensory-motor function.

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Effects of Short-Term Resistance Training On Muscular Strength and Central Adaptations In Cancer Survivors With Fatigue Symptoms Compared to Healthy Women

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Introduction & Aims: We compared the effects of 12-weeks of resistance training (RT) on muscle mass, muscular strength and neuromuscular performance between cancer survivors with persistent fatigue symptoms and healthy women.

Methods: Participants were untrained and included nine disease-free, post-treatment cancer survivors (PTCa), aged 43-66 years, nine healthy women (HEX), aged 41-56 years and eight healthy controls (Con), aged 43-62 years. PTCa and HEX undertook RT, three times a week for 12-weeks. Total body lean mass (TBLM), total body fat mass (TBFM), right arm lean mass (RALM), peak oxygen consumption (VO₂peak), aerobic power index (API), maximal voluntary isometric force (MVF) of the right elbow flexors, MVF normalised to RALM (nMVF), surface electromyography (EMG) recordings of the elbow flexors normalised to maximal muscle compound action potential from the brachial plexus and fatigue symptoms using self-report questionnaires were collected Pre and Post RT. Single pulse transcranial magnetic stimulation (TMS) was delivered to the motor cortex to determine voluntary activation (VA) and cortical silent period (SP) duration. One repetition maximum (1RM) was measured Pre, during and Post RT.

Results: VO₂peak, API, and RALM were comparable (P>0.05) while fatigue symptoms were higher for HEx compared to PTCa at Pre (P>0.05). No significant difference in MVF, nMVF; VA, SP, TBLM or TBFM were apparent between or within groups Pre, during or Post (P>0.05). 1RM was higher in HEx compared to PTCa at Pre and after 4 weeks RT but were comparable at Post (P>0.05). RALM was higher in all groups at Post (P=0.007). EMG decreased at Post across all groups (P<0.037).

Conclusion: 12-weeks of RT induced comparable neuromuscular adaptations between untrained women experiencing cancer fatigue compared to healthy women. RT as a single mode exercise regime positively increases muscular strength and RALM with no detrimental effect on fatigue symptoms.
Effects of Short-Term Resistance Training On Neuromuscular Manifestations Associated With A Sustained Maximal Voluntary Contraction In Cancer Survivors with Fatigue Symptoms And Healthy Women

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Introduction & Aims: We compared neuromotor performance associated with a sustained, maximal isometric contraction (MVC) of the elbow flexors before and after 12-weeks of resistance training (RT) between cancer survivors with persistent fatigue symptoms and healthy women.

Methods: Participants were untrained and included nine disease-free, post-treatment cancer survivors (PTCa), aged 43-66 years, nine healthy women (HEx), aged 41-56 years and eight healthy controls (Con), aged 43-62 years. PTCa and HEx undertook RT, three times a week for 12-weeks. All groups performed a 2-min MVC Pre and Post RT. Maximal voluntary torque (MVT) at 0°/s, surface EMG recordings of the biceps brachii (BB) and brachioradialis (BR), reported as median frequency (MDF), central activation ratio (CAR) and SP using single pulse transcranial magnetic stimulation (TMS) were measured during MVC.

Results: Between group differences were observed for maximal force during MVC which were higher in PTCa Post RT compared to HEx at 45, 65, and 85 sec (P<0.01) and for SP with shorter duration observed in HEx and Con Pre RT compared to PTCa at 65 and 85 sec during MVC (P<0.05). SP Post RT was significantly shorter in Con compared to PTCa at all time points (P<0.05). CAR during MVC decreased between 5 sec, and 45, 105 and 120sec Pre RT (P<0.05) and between 65 and 85 sec during MVC (P<0.05). MVT during task decreased Pre and Post RT across all time points (P<0.001). CAR during MVC decreased between 5 sec, and 45, 105 and 120sec Pre RT (P<0.05) and between 5, 45, 85 and 105 sec Post RT (P<0.05).

Conclusion: The neuromuscular manifestations of fatigue associated with exercise-induced fatigue were comparable between PTCa and HEx. Our finding for longer SP duration associated with a 2-min MVC in PTCa Pre RT compared to HW provides some evidence of greater cortical inhibition. Further studies should investigate possible inhibitory mechanisms using a paired pulse TMS protocol.

Changes in heart rate variability after a standard-care phase II cardiac rehabilitation program

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Introduction & Aims: Poor cardiac autonomic control and reduced heart rate variability (HRV) are associated with an elevated risk of cardiac mortality. Furthermore, HRV is commonly depressed after cardiac events. The aim of this study was to assess whether HRV improves after patients complete a standard-care phase II cardiac rehabilitation program.

Methods: Nine participants (mean age 56.2 ± 11.2 years) completed a standard-care, once-per-week, 12-week cardiac rehabilitation program encompassing exercise and education. Dosage of medication, including β-blockers and ACE-inhibitors, was consistent throughout the study. Five-minute, five-lead resting ECG (AR-12; Schiller, Switzerland) were obtained under controlled conditions at baseline and after discharge from cardiac rehabilitation. Time and frequency domain HRV were calculated using Medilog Darwin2 (Schiller, Switzerland).

Results: After cardiac rehabilitation, significant increases were observed in the root mean square of successive differences between adjacent N-N intervals (14.7 ± 18.9 ms) and the proportion of N-N intervals greater than 50 ms apart [median change (interquartile range) 10.8% (-0.3 to 28.9%)]. In the frequency domain, there was a significant increase in total power (1306.8 ± 1631.7 ms²) and significant decreases in low frequency power in normalised units (-13.7 ± 16.6%) and the log of low frequency power divided by high frequency power (-0.4 ± 0.4).

Conclusion: The results from this study demonstrate that patients improved HRV from baseline to discharge from cardiac rehabilitation. Improved cardiac autonomic control is likely to result from exercise-induced changes in vagal tone and parasympathetic activity. As such, these findings suggest that a standard-care phase II cardiac rehabilitation program can improve HRV and cardiac autonomic control, decreasing the risk of cardiac mortality.
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Deconstructing Hydration: investigating the hydration status and perceptions of civil construction workers

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Dehydration, resulting from a loss of as little as 1-2% body weight, can directly impair physical performance and thermoregulation while intensifying fatigue and perceptions of exertion during physical activity. At present, research has largely focused on sporting populations with minimal research assessing the severity of this issue within workplaces and its corresponding impact on performance and safety. Workers within the construction industry are exposed to extreme heat conditions, high-risk work duties, and cognitively demanding tasks. Dehydration among this population group has the potential to enhance heat related illness, workplace injury¹, and reduce work performance with substantial outcomes. The aim of this study was to assess the hydration status, related perceptions and behaviours of civil construction workers during the hot and humid conditions of Queensland’s summer as a component of a larger injury prevention and wellbeing program. To assess this, 89 civil construction workers completed a questionnaire investigating their perceived hydration status and behaviours at the commencement of their work day. Hydration status of participants was also assessed through urine specific gravity (USG) measurement and urine colour chart assessment. Of the initial participants, 26 were re-tested for their hydration status a minimum four hours after the initial test to assess changes in hydration. Despite 72% of workers perceiving themselves to be adequately hydrated at the commencement of their work day, the majority (52%) were assessed as dehydrated (USG >1.02). Levels of dehydration increased throughout the shift with 69% re-tested as dehydrated and only 1 participant (4%) maintaining an adequate level of hydration throughout the time period. The results of this study highlight the severity of dehydration within the construction industry and the need to address this to improve the health and safety of the workforce.

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Case Study: Exercise testing and the second wind phenomenon in a 9 year old girl with McArdle disease

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McArdle disease is a rare metabolic muscle disorder where the ability to access muscle glycogen stores is impaired due to deficiency of muscle phosphorylase. Presenting symptoms include poor exercise tolerance and muscle pain, particularly with high intensity activities. One feature of McArdle disease is the second wind phenomenon, where pain and fatigue symptoms with exercise reduce due to the shift towards alternative fuel sources, ie. free fatty acid oxidation and glucose from hepatic glycogenolysis. High intensity exercise can lead to rhabdomyolysis so caution with exercise is needed. Tailored exercise plays an important role in symptom management by increasing the efficiency of OXPHOS. It is suggested that a glucose load taken prior to exercise may help reduce symptoms by increasing available glucose in the plasma to prolong activity. A 9 year old girl with McArdle disease presented for exercise testing. She exercised on a cycle ergometer at a fixed workload of 10W for 15mins. Pain rating, heart rate (HR), oxygen uptake and rating of perceived exertion (RPE) were recorded each minute. The exercise test was repeated on a different day following ingestion of a glucose load 10mins prior to exercise. The second wind phenomenon, indicated by a reduction in pain rating, was observed between minutes 7-9 of the initial exercise test. At this point, pain levels reduced from 6/10 to 3/10 and the patient was able to continue exercising comfortably. HR reduced from 118 to 107 bpm. HR and pain response were reduced with exercise following glucose ingestion and there was a less pronounced second wind effect. Pain ratings were consistently lower across each minute of exercise. It appears that pre-exercise glucose ingestion is useful for reducing HR and muscle pain with moderate exercise in McArdle disease. This may assist with symptom management and maximising participation in exercise to increase aerobic capacity which has been associated with an improved clinical course.
Influence of travel, compression socks and marathon running on haemostatic activation

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Introduction & Aims: Prolonged air travel and exercise are associated with an increased risk of thrombosis (1,2). When combined, acute coagulation activation occurs post-exercise (3). Compression socks may reduce haemostatic activation when worn during exercise. This study investigated the effect of pre-marathon travel (duration) on haemostatic markers and the influence of compression socks on coagulation activation following a marathon.

Methods: 42 runners travelling domestically (DOM) and 25 runners travelling internationally (INT) to compete in a marathon were recruited. Runners were allocated to wear compression socks (SOCK: DOM (n=19), INT (n=15)) or no compression socks (CONTROL: DOM (n=23), INT (n=10)) during the marathon. Venous blood samples were obtained 24h prior-to and immediately post-marathon and analysed for thrombin anti-thrombin (TAT) complex, tissue factor factor inhibitor (TFPI) & D-Dimer.

Results: Pre-exercise concentrations of D-Dimer were higher in INT compared to DOM (p<0.0001). A main effect for magnitude of change (PRE-POST) for TF (p=0.02) and D-Dimer (p=0.002) was observed, with the magnitude of change for D-Dimer significantly greater in the CONTROL:DOM group when compared to SOCK:DOM and SOCK:INT (p<0.02).

Conclusion: Greater pre-exercise coagulation activation was observed in runners travelling internationally versus domestically. When worn during a marathon run, compression socks were shown to reduce the magnitude of change in D-Dimer (a marker of coagulation activation and blood clot breakdown) only. Therefore, compression socks may reduce post-marathon haemostatic activation, despite the initial increase in pre-marathon coagulation activation.

References

Folic acid supplementation and vascular health in patients with heart failure

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Introduction & Aims: Systemic vascular dysfunction is a known consequence of heart failure (HF), and contributes to a range of co-morbidities and adverse clinical outcomes associated with the disease. Nitric oxide (NO) pathways, particularly in the vascular endothelium have been implicated in the aetiology of vascular dysfunction. Folic acid is a known dietary antioxidant and has been shown to increase NO bioavailability. The aim of this study was to examine the effect of six weeks of folic acid supplementation (5 mg/day) on indices of vascular health in men with stable heart failure (n=8, 63±7 yr, BMI: 29.3±4.6 kg/m², LVEF: 44±11%, VO2peak: 19.1±5.3 mL/kg/min) and healthy controls (CON; n=10, 61±7 yr, BMI: 25.9±3.1 kg/m², LVEF: 66±8%, VO2peak: 34.1±6.6 mL/kg/min).

Results: Serum folic acid concentration increased significantly (P<0.01) following the intervention in both HF and CON by 541% and 309%, respectively, from baseline (HF: 1.40±0.21; CON: 1.28±0.57 ng/mL). Systolic, diastolic and central aortic pressures and carotid-brachial artery pulse wave velocity were not significantly altered by folic acid supplementation in both groups. Brachial artery flow-mediated dilation (FMD) increased significantly in HF (Pre: 3.35±1.15; Post: 5.88±1.21%, P<0.01) with folic acid; however, no significant change was observed in CON (Pre: 4.54±2.49; Post: 5.72±2.65%, p=0.08).
Conclusion: Relatively high daily doses of folic acid supplementation for six weeks increased circulating blood folic acid concentration and improved forearm vascular endothelial function, likely through enhanced NO-dependent mechanisms, in patients with heart failure.
Internet delivered workplace programs to improve physical activity: A systematic review

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Introduction: Insufficient physical activity (PA) remains a worldwide problem despite strong evidence existing for both a primary and secondary prevention effect on many non-communicable diseases. The internet is now a popular way to deliver behavioural change programs to improve adherence to PA guidelines. The workplace provides a large audience for interventions, with 65.2% of adult Australians in some form of employment. This provides researchers a unique cohort to study. In this systematic review we examined the effectiveness of internet delivered healthy lifestyle programs that target PA in the workplace.

Method: A systematic electronic search was conducted in February 2017 using multiple databases for all published randomised control trials of internet delivered workplace programs that had physical activity as an outcome measure.

Results: Thirty-two eligible randomised trials were included in this review, spanning a total of 14,826 participants, with 58.7% of the participants female. Twelve studies originated from the United States, thirteen from Europe, two each from Australia and Canada, and single studies from Japan and Taiwan. One study was conducted over multiple countries. Significant heterogeneity existed amongst the trials in intervention design and outcome measure. Thirty-one of the studies were classified as unclear risk or high risk of bias using the Cochrane Risk of Bias constructs. Twelve of the thirty-two studies reported significant improvements in PA.

Conclusion: There is currently weak evidence to suggest that internet based PA programs in the workplace are effective. Future research should focus on tailored interventions that utilise supported behavioural theories, include a degree of self-monitoring, and develop autonomous supportive environments. Higher quality trials with objective measures of PA are needed.

Active Rehabilitation Improves Function and Health of a Morbidly Obese 15 Year Old Boy: A Case Study of Treatment Provided by the Be Inspired Foundation

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Introduction: The Be Inspired Foundation was founded to provide scholarships for active rehabilitation to disadvantaged Western Australian youth living with chronic disease, cancer, disabilities or major trauma. This case study examines the effects of this novel model of care on a young male living with morbid obesity. At baseline he presented with a body mass 195kg and low functional capacity. A progressive exercise program was initiated in combination with counselling once a fortnight and four sessions with an accredited practising dietitian. Only resistance exercise was prescribed for the first three months. Progressively the total volume increased from one to three times per day. After 12 weeks, daily aerobic activity was introduced.

Results: Over the 6-month intervention clinically meaningful changes were apparent in multiple physical and functional domains. Time to complete a 400m walk test reduced (453s to 320s) indicating a 29% improvement in aerobic capacity. Upper body strength was significantly greater at 6 months; Client A could complete 15 modified push ups compared to 2 reps at baseline. Additionally, lower body strength and power increased by 36%, measured using countermovement jump height. Body mass reduced by 11kg. Qualitative feedback was equally positive indicating Client A increased confidence and enjoyed participating in the program. “He enjoys his sessions with [the exercise physiologist] and now he is going to a group session once a week to try and get him back into the community and around people”.

Conclusion: Active rehabilitation improved the physical and functional capacity of the Client and resulted in long-term lifestyle changes. The Be Inspired Foundation model of care is able to support young individuals with complex medical conditions who lack access to expensive and private allied health services.
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Exploring the experiences of student exercise physiologists on placement in child and adolescent mental health in Brisbane

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Introduction & Aims: The number of student exercise physiology placements in acute child and adolescent mental health settings are on the rise. These placements provide exercise physiologists in training with an opportunity to work with a new and expanding area of practice for exercise physiologists. This qualitative study explored the experiences of student exercise physiologists who completed a placement in either acute or sub-acute child and adolescent mental health settings.

Method: Seven student exercise physiologists who completed a student placement at Queensland Health Child and Youth Mental Health Service (CYMHS) in 2017 were invited to participate in a semi-structured interview. The interviews provided the students opportunities to “tell their stories” – their experiences of undertaking a student placement in CYMHS, their interpretations and understandings of those experiences, and their perceptions of how these experiences have influenced (positively or negatively) their training as an exercise physiologist. Data from the interviews were organised and interpreted using content analysis, whereby individual meaning units in the data were identified, coded and categorised into primary and secondary themes.

Results & Conclusion: The placements provided the students with a unique opportunity to work with age groups and clinical presentations that they were not otherwise exposed to in their degree. Some students felt underprepared for their placements due to a lack of theoretical knowledge in common diagnoses, medications, and usual care practices prior to the commencement of placement. Concerns were raised regarding the risk of exposure to vicarious trauma while on placement. Overall, the students believed their CYMHS placement provided an invaluable opportunity to develop their critical thinking, problem solving and communication skills as exercise physiologists.

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Effects of Proprioceptive Neuromuscular Facilitation (PNF) techniques introduced in Yoga program on flexibility of female University students

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Introduction & Aims: Yoga is very popular in China and there is continuing research interest in evaluating the potential benefits considering demographic factors and differences in prescription within different yoga practices. Improved flexibility is an important outcome measure when learning Yoga and is also one of the main resistances for continuing practices. Proprioceptive Neuromuscular Facilitation (PNF) is a well-recognized technique characterized by increasing the flexibility of muscles. As such the aim of study was to evaluate the impact of PNF as a relaxation activity in a Yoga program for university students.

Methods: 114 female students were randomly assigned to a PNF group (n=70) and control group (n=44) with no significant differences in their flexibility. The intervention included a Yoga program delivered once a week for a period of 16 weeks. The program included selective Yoga movements including a 20-minute warm up, 55-minute Asana and 15 minutes relaxation activities. The PNF group also used a hold-relax-antagonist contraction PNF technique for stretching shoulder and hamstring muscles. Holding stick control posture tested shoulder flexibility and sitting body flexion tested hamstring flexibility. The control group also used supine relaxation.

Results: Using Paired sample t-test, the results showed significant improvement in shoulder and hamstring flexibility (P<0.01) in the PNF group, while C group flexibility improved without significant difference (P>0.05). After different relaxing, PNF groups’ mean of holding stick reduced 7.45cm, mean of sitting body flexion increased 1.05cm. One-way comparison of the PNF and C group for shoulder and hamstring flexibility at 16 weeks, showed higher flexibility for the PNF group (P<0.01), but hamstring flexibility without significant difference with C group (P>0.05).

Conclusions: PNF is benefit for students’ flexibility as relaxing activity in Yoga program. And it play more role in shoulder flexibility than hamstring.
Physical Limitation and Reduced Quality of Life in Chronic Kidney Disease: Examining the Contribution of Peripheral Neuropathy

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Introduction: Approximately 1.7 million Australians have clinical evidence of chronic kidney disease (CKD). Physical limitation and reduced quality of life (QoL) have an adverse effect on patient outcomes in these patients. Peripheral neuropathy (PN) is common consequence of CKD and may be an important contributor to morbidity and physical limitation. This study aimed to determine prevalence of PN and its relationship with physical function and QoL in CKD.

Methods: Eighty patients with stage 3–4 CKD were recruited. Physical function was assessed by measuring walking speed and handgrip strength. QoL was measured using the SF-36 questionnaire. PN was assessed using the total neuropathy score (TNS). Analysis was undertaken on the cohort as a whole followed by subgroup analysis according to the presence of diabetes (DKD).

Results: The cohort had a mean age 62±13 years, a mean eGFR of 38±11 mL/min and BMI of 30±5 kg/m². Walking speed was 25% lower in CKD patients (M 1.45±0.34; F 1.28±0.30 m/s) than age match reference values. Handgrip strength was preserved. PN was present in 74% of patients. Increasing PN severity was significantly (p<0.001) correlated with slower walking speed and lower physical function QoL. Multiple linear regression of factors contributing to reduced walking speed demonstrated that PN was the strongest predictor of walking speed (p<0.001; β 0.7), with gender, age and parathyroid hormone also significantly contributing to the model (p<0.05) while BMI and eGFR did not. Subgroup analysis of patients with DKD (n=46) demonstrated a higher prevalence (89% vs 58%) and greater severity (p<0.001) of PN. The DKD subgroup also demonstrated significantly slower walking speeds and worse scores on several QoL domains.

Conclusion: These data indicate a high prevalence of PN in early CKD that has a significant impact on physical function and QoL which is exacerbated by the coexistence of diabetes. Consideration of PN is critical when working with this patient population.

Embedding a ‘clinic’ in curriculum: student and client perceptions of the intra-curricular student-led Exercise Lifestyle Clinic

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Introduction and Aims: The Exercise Lifestyle Clinic (ELC) is a high-fidelity work integrated learning (WIL) initiative embedded within a postgraduate exercise physiology practicum unit. The ELC transforms the classroom into a clinic and seeks to expose students to the fundamental practices of the EP profession in preparation for external clinical placement. This study aimed to explore 1) students’ perceptions of WIL and 2) clients’ satisfaction with EP services delivered by student practitioners.

Methods: In both 2016 and 2017 the Australian Catholic University EP degree facilitated a pop-up exercise physiology clinic. Students were allocated a two-client case-load and were responsible for all elements of case management including initial and review consultations, clinical reporting, client correspondence and case conferencing. Student perceptions of WIL in the ELC were evaluated using the Satisfaction with Clinical Experience Survey and a sub-sample of students participated in semi-structured focus groups. Clients’ satisfaction of clinical services was rated using the Client Satisfaction Questionnaire.

Results: Students perceived the ELC as a valuable learning experience. It appeared to challenge their perceptions of the professional construct as students “put into practice” previously learnt knowledge and skills. Although most clients had never received EP services prior to attending the ELC, service quality was rated as excellent (75%) or good (25%). Clients suggested individualised exercise and education were the best aspects of the ELC.

Discussion: The ELC adopts a challenging and supportive WIL model that initiates the transition in perceived-self from student to professional. Learnings from development and implementation of the ELC may be useful to university curriculum developers and clinical educators. Further research is required to determine change in students’ clinical performance in subsequent external placements following participation in the ELC.
EXERCISE SCIENCE + HEALTH
POSTER PRESENTATIONS
Supporting quality improvement of exercise physiology practicum through benchmarking; a protocol for what to benchmark and how

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Benchmarking between universities supports a continuous cycle of quality improvement and is now an expectation of standard practice under the new course accreditation requirements set by Exercise and Sports Science Australia. In 2017, academic staff involved with the clinical education programs for accredited exercise physiology degrees at the University of Sydney and the University of Canberra agreed to benchmark practicum programs. But this agreement immediately led to questions around what would be benchmarked, how and why. To date, there is no established benchmarking protocol for exercise physiology practicum in Australia to guide universities in order to satisfy this new requirement. Therefore, the aim of this project is to design a protocol for benchmarking practicum between university programs which covers the formation of a partnership, the scope of the benchmarking exercise, a framework against which to benchmark practicum and an instructional guide outlining how the benchmarks can be used for self-assessment and comparison between universities. The framework for benchmarking will be derived from the Australasian Council on Open, Distance and E-Learning Benchmarking Framework (2014). The benchmarks will cover four areas; practicum learning outcomes, assessment, preparing students to succeed during their practicum and support for practicum supervisors. For each benchmark, the framework will articulate a scoping statement, a good practice statement and a set of performance indicators. A protocol for benchmarking that other universities can use in their efforts to benchmark practicum is an expected outcome of this project.


Effects of exercise and cognitive training in healthy older adults: A pilot randomised control trial

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Introduction & Aims: The aim of this study was to compare the effects of exercise training with a combined intervention of exercise and cognitive training on cognition, physical fitness and psychological wellbeing in sedentary, community dwelling older adults.

Methods: Thirty-nine participants aged between 60 and 80 years old with good cognitive function, as measured by the Telephone Interview for Cognitive Status measure, were randomly assigned to either: 1) control group (C), 2) exercise group (Ex) or 3) exercise and cognitive training group (ExC). The Ex group performed supervised progressive aerobic and resistance training three times per week and the ExC group performed the same training twice per week and one cognitive training session per week. Demographic and anthropometric characteristics, psychological wellbeing, and physical fitness, along with 4 areas of cognitive function (including: memory, executive functioning, mental speed and functional activities) were assessed at baseline and following 16 weeks of training.

Results: The ExC group had a significant improvement (p<0.05) in memory (California Verbal Learning Test, ExC: +4.9, E: +3.4, C: -2.6) and arm curls (ExC: +2.6, E: +1.9, C: -0.5). In both intervention groups there was a decline in one measure of executive function (Delis Kaplan Executive Function Scale Sorting, ExC: -1.4, Ex: -1.61, C: +1.13) and an increase in diastolic blood pressure (ExC: +3.64, Ex: +4.6, C: -7.7). Chi squared analysis indicated individuals with lower baseline scores were more likely to have improved cognition scores in follow up testing.

Conclusion: Targeting older individuals with lower initial cognitive function with an exercise or combined intervention may help to preserve or improve cognition.
Altered mitochondrial respiration rates in women with polycystic ovary syndrome following 16 weeks of high intensity interval training: preliminary data from a randomized controlled trial

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Introduction: Polycystic ovary syndrome (PCOS) is an endocrine disorder affecting ~20% of reproductive-aged women. Beyond causing infertility, PCOS is associated with metabolic disorders such as insulin resistance. The mechanisms underlying the insulin resistance in PCOS are unclear, but are suggested to be related to abnormal adipose tissue function and morphology. Exercise training improves insulin resistance in PCOS, but the underlying mechanisms for improved whole-body and tissue-specific metabolism after training in women with PCOS are unknown.

Aim: To investigate the effect of high intensity interval training (HIT) on adipose tissue mitochondrial respiration in women with PCOS.

Methods: Six previously sedentary women with PCOS (32±6 years, 30.2±7.5 kg/m²) were randomized to two different HIT groups (three times per week, either 10x1 min “all-out” intervals (n=1) or 4x4 min reaching 90-95% of HRmax (n=2)) for 16 weeks, or control (n=3). A biopsy was obtained from abdominal subcutaneous adipose tissue at baseline and after 16 weeks. Adipose tissue function was measured as mitochondrial respiration using high-resolution respirometry. The two HIT groups were combined in the analysis.

Results: There were no changes in body fat percentage in the groups. The mitochondrial oxidative phosphorylation (OXPHOS) capacity was reduced by 18% after HIT (P=0.015). There was a tendency towards lower OXPHOS capacity through complex I (22% lower, P=0.059) and higher uncoupled respiration (7% higher, P=0.053) after HIT. We observed no differences in the respiration rates of the control group as well as no between-group differences.

Conclusion: Various states of the mitochondrial respiration rates in abdominal subcutaneous adipose tissue were altered after 16 weeks of HIT in women with PCOS. These alterations might be associated with exercise-induced improvements in insulin resistance.

Extra: As this is an ongoing study, we will have more data at the time of the conference.

The illusion of evidence? A systematic review of practice guidelines in applied exercise science for cardiovascular health and disease

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Introduction and Aims: The role of exercise is well established in managing cardiovascular health and function. Less clear is the process for optimising the safety and efficacy of an intervention, particularly how objective assessments might inform this process. This study aimed to investigate the evidence base for objective assessment to support the prescription of exercise for managing cardiovascular health and disease.

Methods: A systematic review of guideline papers on exercise prescription for cardiovascular health was conducted. Inclusion criteria were 1) English language full-text paper; 2) was a guideline (intention of paper is to guide/inform practice) published under the auspices of a recognised professional organisation; 3) was aimed at cardiovascular health or disease 4) made specific recommendation(s) for objective assessment to inform exercise prescription. Study selection and data extraction was performed by two independent reviewers.

Results: Following removal of duplicates 1686 papers were considered of which full text screening was required for 145. Thirty three guideline papers were included which provided 77 individual recommendations for specific objective assessments (eg. ECG, sub-maximal graded exercise test, exercise blood pressure, etc). Most (41 out of 77) provided no reference to support the recommendation, a further 25 provided a reference that was found to not support the statement made, with only 11 statements providing a valid reference to support their clinical guideline.

Conclusion: Clinical guidelines and position statements published by peak bodies in cardiology or exercise science/ sports medicine are widely accepted as informing best practice. These results suggest that the practice of exercise science is not free
from a reliance on eminence rather than evidence based practice. Future guidelines should be clear on the evidence base for any recommendation and/or be more transparent and methodical in the use of 'expert' opinion.
Meeting the target score of a novel metric for physical activity tracking (Personal Activity Intelligence, PAI) attenuates the risk of non-alcoholic fatty liver disease regardless of sedentary time

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Background: Non-alcoholic fatty liver disease (NAFLD) is highly prevalent and is an independent predictor of type 2 diabetes and cardiovascular diseases (CVD). Prolonged sedentary time (ST) is a risk factor for CVD and NAFLD. A novel metric for physical activity (PA) tracking named Personal Activity Intelligence (PAI) has recently been developed. PAI is quantified by monitoring heart rate (HR) patterns, and therefore takes into account the added benefits of performing higher intensity PA. A score of ≥100PAI is associated with a reduced risk of CVD death (independent of meeting current PA recommendations) and attenuates the negative association between ST and CVD risk. However, whether achieving ≥100PAI has a similar protective effect on hepatic health is not known.

Methods: Self-reported ST (average h/d) were divided into sex-specific tertiles. Weekly PAI scores were calculated from age, sex, resting HR and predicted HRmax using a published algorithm. NAFLD status was estimated using the validated Fatty Liver Index (FLI). Adjusted odds ratios (OR) and 95% confidence intervals (CI) were estimated using logistic regression analyses.

Results: 16,561 adults (52% female) were included. Prevalence of NAFLD was 35.8%. Individuals with ST>7h/d had a 39% (OR,1.39; CI,1.19-1.61) higher likelihood of having NAFLD compared to those with <4h/d. Individuals who were inactive (OPAI) had a 56% (OR,1.56; CI,1.35-1.81) greater likelihood of having NAFLD compared to those who achieved ≥100PAI. Combined analyses revealed that compared to the reference group (≥100PAI and ST<4h/d), sedentary individuals (ST>7h/d) not achieving ≥100PAI had an 86% (OR,1.86; CI,1.48-2.33) higher likelihood of having NAFLD, while sedentary individuals (ST>7h/d) who managed to achieve ≥100PAI were protected (OR,1.22; CI,0.97-1.57).

Conclusions: Achieving a score of ≥100PAI weekly attenuates the adverse effects of ST on liver health. Monitoring PAI could be a useful novel strategy to protect against NAFLD.

Elliptical trainer (weight supported) with Rehabilitation software and goal orientated exercises provides functional and emotional improvements in adults with neurological injuries

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Aim: To compare effects of low to moderate intensity exercise, for adults with complex chronic disease and limited mobility.

Design and Method: Inclusions - a cross section of 9 clients attending rehabilitation to improve functional and emotional capacity. Treatment data was collected and compared at baseline and 6 months for measures of gait speed (10 m walk test), Visual Analogue Scale for Fatigue (VAS-F) and Visual Analogue Mood Scales (VAMS). An individual protocol was planned for each person; clients were encouraged to work towards BORG RPE 13 while using the weight supported elliptical trainer. The rehabilitation software and goal orientated exercise programs where individualized to encourage clients to initiate mental strategies and physical reactions that could be measured in real time.

Results: Comparison of baseline and 6 month measures showed average improvement was 8.7 (sd 8.05) seconds and 0.08 (sd 0.09) m/s for gait speed. Subjective results for VAS-F demonstrated a reduction in fatigue levels, while VAMS demonstrated improvement in mood.

Conclusions: These results support the novel use of a weight bearing elliptical trainer device to enhance rehabilitation in this client group, with the support of rehabilitation software and goal orientated exercise program. Further research is required.

Clinical Implications: This may provide an opportunity to meet recommended guidelines for physical activity following a stroke, while potentially providing an alternative to the current rehabilitation model.
Eating around the clock: A randomised controlled trial investigating the effect of morning vs evening exercise on the temporal distribution of energy and macronutrient intakes

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Introduction and aims: Exercise can alter energy intake (EI) via changes in appetite and food preferences, which may affect the efficacy of exercise in supporting weight loss. Before or after work (i.e. in the morning or evening) are practical times for individuals to incorporate exercise, but it is unknown how individuals change their eating patterns in response to morning and evening exercise. Some evidence suggests that eating more calories later in the day is associated with poorer diet quality and higher body mass index. Therefore, the purpose of this study was to investigate how overweight individuals distribute their EI in response to morning (AMEx) or evening (PMEx) exercise.

Methods: Forty-three inactive adults (age 41±12 y; females=69%; BMI=31±4 kg/m²) were randomised into one of two 12-week self-paced aerobic training programs: AMEx (n=21), or PMEx (n=22). EI was measured at baseline, and mid-intervention using a 5-step multiple-pass 24h food recall. Absolute daily energy and macronutrient intakes, and temporal distribution of energy and macronutrients, assessed over five periods during the day (0600-0959, 1000-1359, 1400-1759, 1800-2159, and 2200-0159 h), were calculated.

Results: Both AMEx and PMEx significantly reduced EI from baseline to mid-intervention (7740±4042 vs 5523±2195; 9530±3123 vs 6531±1939 kJ, respectively; p=0.04), but there were no between-group differences. After 6-weeks of training, there was a trend for EI in AMEx group to be higher in the lunch period (1000-1359), compared with the PMEx group, whose EI was higher in the dinner period (1800-2159). However, these differences were not significant.

Conclusion: This study supports previous work that exercise can moderate appetite. Lunch and dinner periods appear to offer compensatory occasions in response to morning and evening exercise, respectively. Since eating later in the day has been associated with increased EI and obesity, exercise timing may play a role in weight management.

Effects of low volume high-intensity interval and moderate intensity continuous training on arterial stiffness and blood pressure in patients with type 2 diabetes: A randomised controlled trial

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Introduction & Aims: Arterial stiffness (AS) is thought to increase with glucose intolerance. Moderate intensity continuous aerobic training with moderate intensity resistance training (MICT+MR) has been shown to improve AS in patients with chronic disease. The combination of high-intensity interval aerobic with high-intensity resistance training (HIIT+HR) has not been previously investigated in patients with type 2 diabetes (T2D). We aimed to compare the efficacy of 8 weeks of low volume HIIT+HR and MICT+MR on AS, central and peripheral blood pressures in patients with T2D.

Methods: Forty sedentary adults (60±8y) with T2D (HbA1c 7.7±1.2%) were randomised into 8wks of either: low volume HIIT+HR (n=14), MICT+MR (n=16), or control (n=10). HIIT+HR involved aerobic exercise for 4min at 85-95% peak heart rate (HRpeak) followed by high-intensity resistance training (Rate of Perceived Exertion [RPE] ≥17) involving 8 exercises for 1-min each, on three days/week. Session time was 26mins = 78mins/week. MICT+MR comprised aerobic exercise for 150mins/wk over four days at 55-69% HRpeak and moderate intensity resistance training 60mins/wk (RPE 11-13). Total exercise time = 210 mins/week. AS was assessed using pulse wave velocity (PWV), central blood pressures were assessed using pulse wave analysis and peripheral pressures using sphygmomanometry; at baseline and post-intervention.

Results: There were no significant between-group differences for change in PWV (0.2±0.1m/s, 0.2±0.2m/s, and 0.2±0.4m/s for HIIT+HR, MICT+MR and control, respectively), central systolic (0.2±2.7mmHg, -1.3±1.3mmHg, 2.8±3.7mmHg) and diastolic (-0.9±0.9mmHg, 0.8±0.9mmHg, and 0.1±0.9mmHg, respectively).
Impact of body size on energy cost of walking at self-selected ‘walking for exercise’ pace

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Introduction: The rate of metabolism increases curvilinearly with walking speed, and plotting energy consumed per unit distance vs. walking speed forms a U-shaped curve. Consequently, for each individual there is one speed that minimizes the energy required to walk a given distance, and this speed has been reproducibly shown to correspond to preferred habitual walking speed. While obese adults are reported to have lower preferred habitual walking speed and higher energetic costs at this speed, whether this holds at ‘walking for exercise’ speeds is not well researched. We examined the impact of body size on energy costs at self-paced walking for exercise (SPW) speed in a heterogeneous sample of adults, and examined measures for standardising the energy cost of walking.

Methods: The study sample comprised 201 adults aged 20-64 y, 150-192 cm in height, weighing 48-133 kg (18-44 kg.m⁻²). SPW speed was determined from 2 × 2000 m overground trials at individually defined ‘walking for exercise’ pace. The energy cost of walking on a treadmill at speeds below, equal to, and above the SPW speed was determined from gas-exchange measures. On a separate testing day, resting energy expenditure, body composition and anthropometry measures were performed.

Results: SPW speed (m.s⁻¹) was statistically significantly higher in males (1.68 ± 0.14) than females (1.62 ± 0.15), did not differ significantly across the age categories or BMI categories in males, but was significantly lower in obese (1.54 ± 0.16) compared with normal weight (1.67 ± 0.15) and overweight (1.63 ± 0.12) women. Energy cost of walking (kcal.min⁻¹) increased from normal (5.7 ± 1.4) to overweight (6.6 ± 1.3) to obese groups (7.5 ± 1.8; P<0.001), but BMI group differences were no longer evident after accounting for walking speed and body mass.

Conclusion: These results suggest that while absolute energy cost at self-selected ‘walking for exercise’ speed increases with body size, obesity does not impact walking economy.

Investigation of effective feedback strategies for older adults during a sit to stand task

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Effective feedback strategies have been used in the development of motor skills in able-bodied and athletic populations, however, there is little evidence to support the application of these principles to clinical populations. Instructors typically provide a visual demonstration and/or verbal cues when providing feedback, however it is unknown whether older adults and clinical populations are able to translate and use the perceptual image provided to them when learning and relearning effective movement strategies. Based on the dynamical systems theory, an individual will self-organise their degrees of freedom to a movement pattern dependent on the constraints that are imposed on their individualised system. This suggests that feedback relative to one’s self and their own constraints would provide a better representation from which to modify their movement, as opposed to feedback presented and described by the clinician. Our working hypothesis is that feedback must be individualised and personalized to maximize its effectiveness. We investigated this using a randomized-controlled trial with 40 clients, 65 years and older who were ambulatory and free of any lower limb musculoskeletal or degenerative neuro-musculoskeletal condition. Participants performed a sit to stand task from a chair and performance was assessed on nine criteria (six frontal, three sagittal). Specific feedback (verbal or visual feedback of self) was randomized and provided after the first ten trials on two specific criteria, before a further 10 trials were
completed, with the same feedback and modality provided after the fifth trial. The percent improvement following feedback on the two designated criteria was the outcome measure with between group differences analysed using a repeated measures ANOVA. This pilot study provided insight into the most effective mode of feedback for adults 65 years and over when performing a sit to stand task and will subsequently be applied to clinical populations.
Exercise in women with clinically severe obesity

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Background: The rates of morbid obesity are rising rapidly, associated with increased prevalence of physical disabilities during ageing. Exercise training benefits may be blunted in severe obesity, and the addition of exercise training to severe energy restriction does not always lead to more weight loss. Existing literature is focused on overweight and class I obesity. We investigated the role of exercise training on physical function and body composition in women with severe obesity undertaking an energy restricted diet.

Methods: 60 pre-menopausal women with clinically severe obesity (average BMI = 40) were randomised to energy restriction (ER) only or energy restriction plus 300 weekly minutes of exercise training (EXER). Participants underwent testing at 0,3,6, and 12 months for VO₂peak, muscular strength, and body composition.

Results: Upper and lower body strength improved more in EXER compared to ER at all timepoints (p<0.05). VO₂peak increased more in EXER compared to ER at three (M diff ± SEM; 2.5 ± 0.9 ml/kg/min, p=0.006) and six months (M diff ± SEM; 3.1 ± 1.2 ml/kg/min, p=0.007), but not at 12 months (M diff ± SEM; 2.3 ± 1.6 ml/kg/min, p=0.15). There were greater reductions in total mass for EXER (M diff ± SEM, 5.0 ± 1.79kg; p=0.003), (M diff ± SEM; 2.5 ± 0.9kg; p=0.026) at three and six months. Fat mass loss was greater in EXER than ER (M diff ± SEM, 4.9 ± 1.9kg; <0.001), (M diff ± SEM, 5.2 ± 2.8kg; <0.062) at three and six months.

Conclusion: In pre-menopausal women with severe obesity, exercise training when combined with energy restriction leads to greater strength gains at 12 months, and preferential loss of fat mass, protection of lean mass, and greater gains in cardiorespiratory fitness at three and six months, but not at 12 months, when compared to energy restriction alone.

Relationships of Body Composition with Jumping, Speed, Agility, and Anaerobic Power-Capacity In-Season in Women Handball

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The purpose of this study was to investigate of relationships of body composition with jumping, speed, agility, and anaerobic power-capacity in-season in women handball players. Voluntary 14 young women handball players (age: 18±0.9years, body height: 172.3±4.0cm, body weight: 72.5±8.6kg) were participated to the study. All measurement and tests were completed in 2017-2018 season of Turkish Women Handball Super League. Total and segmental body composition parameters (percent body fat, body fat mass, lean body mass, percent arm fat, arm fat mass, lean arm mass, percent leg fat, leg fat mass, lean leg mass, percent torso fat, torso fat mass, lean torso mass) of each player were evaluated with dual-energy X-ray absorptiometry method. Squat jump, countermovement jump, drop jump, agility, sprint (10m, 20m, 30m, and 40m), and anaerobic power-capacity were tested. Relationships of total/segmental body composition parameters with jumping, speed, agility, and anaerobic power-capacity parameters were analysed with Pearson correlation and the probability level was set to p<0.05. As a result of statistical analyses, there were correlations (p<0.05) between physical performance parameters (squat jump, countermovement jump, speed, and anaerobic capacity) and some total/segmental body composition parameters except for lean body mass, lean arm mass, lean leg mass, lean torso mass. In conclusion, it is suggested that it should not allow young male handball players to rise in ectomorphy in-season because some total/segmental body composition parameters based on endomorphy had negative effects on jumping, speed, and anaerobic capacity.