aspa
Asia-Pacific Society for Physical Activity

SESNZ™
SPORT & EXERCISE SCIENCE
NEW ZEALAND

# CONFERENCE 2023

## PROGRAMME & ABSTRACT BOOK

**Monday 27th – Wednesday 29th November**

Te Herenga Waka – Victoria University of Wellington

**Aotearoa New Zealand**

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- Asia-Pacific Society for Physical Activity (ASPA)
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Programme & Abstract Book for the ASPA / SESNZ 2023 Conference held on 27 – 29 November 2023 in Wellington, New Zealand.

**Note about the content of the abstract book:**
***The ASPA and SESNZ conference committees have not made any substantive edits to the content of the abstracts originally submitted by the corresponding authors.***

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## Welcome – ASPA President

Kia ora and welcome to the 3rd Asia-Pacific Society for Physical Activity (ASPA) conference!

We are thrilled to have you join us at Te Herenga Waka—Victoria University of Wellington in Wellington, New Zealand for this year's conference, themed "Mahi Tahi – Working Together." We are proud to co-host this event with Sport and Exercise Science New Zealand (SESNZ) and have put together a comprehensive programme of presentations, workshops, and networking opportunities.

This year, we received a record number of abstract submissions, with 171 regular submissions and 27 late-breaking submissions. This incredible response reflects the broad range of physical activity research, policy, and practice being undertaken across the Asia-Pacific region.

The ASPA programme features a variety of sessions, including 4 keynote presentations, 3 sessions with extended presentations, 8 sessions with regular oral presentations, 11 sessions with short oral presentations, 2 poster sessions, and 5 workshops. We are delighted to welcome over 200 delegates from across Australia, New Zealand, Japan, Hong Kong, Taiwan, Singapore, Malaysia, and Europe.

We are grateful for the hard work of the ASPA Scientific Programme Committee and the Local Organising Committee members, who have made this conference possible. We would also like to thank our generous sponsors: Sport New Zealand Ihi Aotearoa, Heart Foundation Australia, Heart Foundation New Zealand, and AIA Vitality.

We hope you have a wonderful time at the conference and make new connections with colleagues from around the world. Together, we can continue to advance physical activity research, policy, and practice to support active lives across the Asia-Pacific region.

Thank you for your continued support of ASPA.

Professor Jo Salmon
President, ASPA

## Welcome – SESNZ Chair

Welcome to the 2023 Sport & Exercise Science New Zealand (SESNZ) annual conference at Te Herenga Waka—Victoria University of Wellington, held in conjunction with the Asia-Pacific Society for Physical Activity (ASPA).

We very much look forward to catching up with you during the conference. We are delighted to be in Wellington not only for two days, but three days this year, as delegates can join us on Monday for the Strength and Conditioning Satellite Workshop or for the first day of the ASPA Conference. Our three days together in 2023 will offer some fabulous opportunities to connect with colleagues, share research and find ideas for future research directions.

This year, 2023, has seen SESNZ continue to grow as an organisation, in regard to the continued success of the Journal, new partnerships and collaborations and our contribution to the International Confederation of Sport and Exercise Science Practitioners. We will discuss more about these developments at the AGM on Wednesday and hope you can join us to be part of the conversation.

Good luck to all the presenters and don't forget, if you are a student, to register for the student prizes – for the best oral presentation and poster presentation. Winners will be announced on Wednesday afternoon.

A big thank you also goes to our many sponsors: VX Sport, High Performance Sport NZ, gbc Biomed, Cosmed, Radix, Vald, Asics, Myovolt and Omrub. Your support is highly valued and is vital to the success of the conference.

Thank you very much to the University of Otago and Otago Polytechnic for agreeing to be our joint hosts in 2024, and then to Massey University, Auckland who will host the 2025 Conference. If you and your University would be interested to host the either the 2026 or 2027 Conferences please let one of the Board members know.

It is always a huge team effort to bring everything together for a Conference and we are very grateful and appreciative to everyone involved at "Vic" for hosting the event, especially Justin Richards, the Team at Vic and colleagues from ASPA. It has been an absolute pleasure working with you in preparing for this fabulous joint event. Thank you also to Vanessa, our National Manager, for another great year and for all the extra work she undertook behind the scenes to support us in getting things ready for our annual get together.

A warm welcome to all and please do not hesitate to contact any of the Board with feedback suggestions or ideas for the future. If you would like to get involved with the direct work of SESNZ and the Board we would be delighted to hear from you as well.

Professor Nick Draper
Chair, SESNZ

## Ngā mihi nui (thank you) to our SPONSORS

# PLATINUM SPONSORS

**Sport New Zealand Ihi Aotearoa is a kaitiaki (guardian) of the play, active recreation and sport system in Aotearoa New Zealand.**

A central government agency, Sport New Zealand promotes and supports quality experiences in play, active recreation and sport to improve levels of physical activity and, through this, ensure the greatest impact on wellbeing for all New Zealanders. Sport New Zealand's vision is simple - to see Every Body Active in Aotearoa New Zealand.

The Sport New Zealand Group also includes High Performance Sport New Zealand, which leads the high performance sport system, supporting athletes and coaches to deliver performances on the world stage that inspire the nation and its communities, helping to build national identity and promote New Zealand internationally.

Together, Sport New Zealand and High Performance Sport New Zealand provide end-to-end leadership of the system.

VX Sport™ has been working with sports science clients at every level to achieve their goals. We offer 400 metrics such as distance, speed, and heart rate variability to allow coaches to accurately use the data from training and matches – while teams and broadcasters can leverage live-streaming data to drive fan engagement.

VX Sport™ has been powering success on the world stage for over 14 years, helping teams to tournament wins, Olympic medals, and multiple rugby world cups.

VX Sport™ is a proudly New Zealand owned and operated company, using the highest quality components on the market to produce the worlds most advanced athlete monitoring devices. VX Sport's world leading live data streaming technology is built upon a strong technical foundation, which offers superior range, reliability and many more metrics, compared with RFID solutions which have difficulty in delivering in a real-time broadcast environment. In 2021 we released VX Omni™, which is the most accurate indoor athlete monitoring system on the market and provides GPS level accuracy indoors, by using a new AI processing system. VX Sport's new 6th generation hardware products have industry leading range, while offering the smallest live data receiver on the market.

## GOLD SPONSORS

gbcBioMed is proud to be a Gold sponsor of the 2023 SESNZ conference. gbcBioMed has supported SESNZ for many years and remains committed to doing so. It is our way of thanking all our customers, both long term and recent, who have trusted us to provide their equipment and products. Delivering new equipment to labs, teaching facilities and clinics is just as exciting to us as it is for the clients, who have worked hard to achieve funding!

gbcBioMed business philosophy remains constant; to represent world leading manufacturers producing the best products that are unique and innovative along with our unequal commitment to excellent sales and service. gbcBioMed is the company to turn to for your laboratory or testing equipment. We have an excellent reputation for outstanding sales and service support. We will only represent the world's leading brands including Cortex, Ergoline, h/p/cosmos, Accuniq, Cyclus2, BTS, PulmOne, LymphaTouch, Lode and most recently 1080 Motion!

It's been a long year; however I am very optimistic that this is the start of a new era! Enjoy the conference, catch up with old friends and make new ones; learn and contribute new ideas. And talk to us about your next project!

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COSMED is a leading manufacturer of metabolic, body composition and ergo systems.

With the K5, Bod Pod and now Q-NRG becoming the product of choice for their accuracy and easy to use software, COSMED products are utilised by Olympic champions, clinical and research groups around the world offering state of the art innovation and post-sale support by qualified biomed engineers.

The new Q-NRG max has recently joined the family, stop by our booth to learn more.

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Revolutionising Metabolic Health & Performance (www.radixnutrition.co.nz).

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The company provides ready-to-eat meals and breakfasts, protein powders and recovery smoothie powders, that deliver the most nutritionally complete meals available, anytime, anywhere – ready in just a few minutes. Our protein has been developed with Fonterra and has the highest DIASS score (Digestible Indispensable Amino Acid Score) in the world.

Radix is fundamentally a nutrition technology company - RNA (Radix Nutrition Architecture) embodies the company's unique approach to nutritional design. All products are gluten-free and made from 100% natural ingredients, ensuring meals are nutrient-rich, delicious, and cater to varied dietary needs.

Radix Nutrition's role in sports nutrition was evident during the Tokyo Olympics, where many New Zealand and Australian athletes relied on Radix Nutrition. Radix is an official partner of Triathlon New Zealand, Yachting New Zealand, Tennis New Zealand, the Wellington Phoenix and four regional New Zealand rugby unions.

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VALD's innovative range of human measurement technologies are used by more than 4,000 of the world's most elite sporting teams, high performance academies, strength and conditioning departments, physiotherapists, tactical organisations and first responders.

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For more information on VALD systems, visit www.valdperformance.com

## SILVER SPONSORS

The National Heart Foundation of Australia is a not-for-profit organisation dedicated to fighting heart disease, Australia's number one killer. For more than 60 years, we have been the trusted peak body working to improve heart disease prevention, detection and support for all people in Australia. For more information, visit heartfoundation.org.au

ASICS, the acronym, is derived from the Latin phrase, "Anima Sana In Corpore Sano" which translates to "A Sound Mind in a Sound Body."

Over 70 years ago, Mr Kihachiro Onitsuka was looking for a way to provide hope to children in post-war Japan. He settled on making shoes as he knew that sport had the ability to bring hope and lift spirits. His original shoe company, Onitsuka Co. Ltd., would go on to merge with two other companies in 1977, officially creating the ASICS brand that we all know today. At ASICS we are committed to building health and happiness in both mind and body and truly value our medical partnerships that have spanned over 30 years.

## BRONZE SPONSORS

Heart Foundation is New Zealand's heart charity, leading the fight against our country's single biggest killer – heart disease.

Our purpose: to stop all people in New Zealand dying prematurely from heart disease and enable people with heart disease to live full lives.

AIA Australia is a leading life insurance specialist with 50 years' experience and purpose to make a difference in people's lives. In 2014 the company launched AIA Vitality, a world leading, science-based health and wellbeing program, to the Australian market. In July 2017, AIA and its partners launched AIA's health insurance business, now known as AIA Health Insurance.

## OTHER SPONSORS

OMRUB is the leader in an emerging FMCG category of natural anti-inflammatories. Omrub was specifically developed for and tested by professional athletes but has far wider application, successfully treating muscle and joint pain such as that caused by arthritis. Omrub is a certified organic, professional strength muscle rub and can be applied as often as pain occurs, allowing people to manage their pain organically.

Omrub is used by top NZ athletes, past and present, including brand ambassadors Dame Susan Devoy, D.J. Forbes and Fiona Dowling. It is the Official Supplier to Squash NZ and a supporter of Disability Sports Auckland.

Myovolt is a breakthrough wearable physical therapy device for musculoskeletal pain and stiffness relief. Myovolt products have been carefully engineered to conform around the body to effectively deliver Focal Vibration Therapy.

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# Programme at a Glance - Monday 27 November

| | Maclaurin Foyer & Mezzanine | Maclaurin Theatre 103 | Maclaurin Theatre 101 | Maclaurin Theatre 102 | Alan MacDiarmid 102/104 | Alan MacDiarmid 103 | Alan MacDiarmid 101 |
|---|---|---|---|---|---|---|---|
| 8:00 - 8:30 | **Registration - Maclaurin Foyer** | | | | | | |
| 8:30 - 9:30 | **Mihi Whakatau (Welcome Ceremony)** - The Hub | | | | | | |
| 9:30 - 10:30 | **Keynote #1: Dr Anna Rolleston** - Maclaurin Theatre 103 | | | | | | |
| 10:30 - 11:00 | **P1 Posters** | **Morning Tea** | **ASPA Early Career Network Event** | | | | |
| 11:00 - 12:00 | | **SO-111** Physical Literacy | **SO-112** Effects & Scale Up of School Interventions | **SO-113** Reviews & More | **SO-114** School & Community Health | **SO-115** Clinical Populations & Outcomes I | |
| 12:00 - 13:00 | | **RO-121** Leaders in the Field | **RO-122** Physical Activity & Mental Health | **RO-123** Early Childhood | **WS-125** Advocacy Workshop | **RO-124** Clinical Populations & Outcomes II | |
| 13:00 - 14:00 | **P1 Posters** | **Lunch** | **ASPA AGM** | | | | |
| 14:00 - 15:00 | **Keynote #2: Professor Amy Ha** - Maclaurin Theatre 103 | | | | | | |
| 15:00 - 15:30 | **P1 Posters** | **Afternoon Tea** | | | | | |
| 15:30 - 16:30 | | **RO-131** Technology | **RO-132** Older Adults I | **RO-133** Inequities & Rural | **WS-134** SIG-Scaling Up Physical Activity | **WS-135** SIG-Physical Literacy | |
| 16:30 - 17:30 | | **SO-141** Geography & Active Travel | **SO-142** 24 hr Movement | **SO-143** New Directions in Physical Activity | **WS-144** SIG-School Physical Activity | **WS-145** SIG - Physical Activity in Healthcare | |
| 17:30 onward | **ASPA Social Function** - Hunter Lounge | | | | | | |

# Programme at a Glance - Tuesday 28 November

| | Maclaurin Foyer & Mezzanine | | Maclaurin Theatre 103 | Maclaurin Theatre 101 | Maclaurin Theatre 102 | Alan MacDiarmid 102/104 | Alan MacDiarmid 103 | Alan MacDiarmid 101 |
|---|---|---|---|---|---|---|---|---|
| **8:00 - 8:30** | **Registration - Maclaurin Foyer** | | | | | | | |
| **8:30 - 9:00** | **ASPA Hau Kainga Welcome SESNZ Delegates (Day 2 Welcome)** - The Hub | | | | | | | |
| **9:00 - 9:30** | **Cultural Workshop** - The Hub | | | | | | | |
| **9:30 - 10:30** | **Keynote #3: Professor Tony Okely** - Maclaurin Theatre 103 (video stream Maclaurin Theatre 101) | | | | | | | |
| **10:30 - 11:00** | **P2 Posters** | **Morning Tea** | | | | | | |
| **11:00 - 12:00** | | | **EO-211** Scale Up & Translation | **EO-212** Geography & Active Transport | **EO-213** Exercise Physiology I (Invite: Kade Davison) | **EO-214** Workplaces | **EO-215** Strength & Condition I | **EO-216** Sport & Exercise Psychology I (Invite: John Sullivan) |
| **12:00 - 13:00** | | | **RO-221** Indigenous & Pasifika Peoples | **Panel-222** Panel Discussion - Evidence Translation ***(Sponsor: HPSNZ)*** | **WS-223** Exercise Physiology (Industry Forum) | | | |
| **13:00 - 14:00** | **P2 Posters** | **Lunch** | | | | | | |
| **14:00 - 15:00** | | | **SO-231** School Interventions | **SO-232** Policy, Implementation & Stakeholders | **WS-233** Exercise Physiology (AEP/CEP Future Strategy) | **SO-234** Older Adults II | **SO-235** Strength & Condition II (Invite: David Pyne) | **SO-236** Female Athletes (Invite: Stephen Fenemor) |
| **15:00 - 15:30** | **P2 Posters** | **Afternoon Tea** | | | | | | |
| **15:30 - 16:30** | **Keynote #4: Dame Professor Farah Rangikoepa Palmer *(Sponsor: Sport NZ)*** - Maclaurin Theatre 103 (video stream Maclaurin Theatre 101) | | | | | | | |
| **16:30 - 17:00** | **Whakawatea – farewell ASPA delegates (Day 2 Closing)** - Maclaurin Theatre 103 (video stream Maclaurin Theatre 101) | | | | | | | |
| **17:00 onward** | **SESNZ Social Function** - Hunter Lounge | | | | | | | |
| | ***Sponsor stalls in Maclaurin MC153 Foyer / Mezzanine & Te Toki A Rata Foyer*** | | | | | | | |

# Programme at a Glance - Wednesday 29 November

| | Maclaurin Foyer & Mezzanine | Maclaurin Theatre 103 | Maclaurin Theatre 101 | Maclaurin Theatre 102 | Alan MacDiarmid 102/104 | Alan MacDiarmid 103 | Alan MacDiarmid 101 |
|---|---|---|---|---|---|---|---|
| **8:00 - 8:30** | **Registration - Maclaurin Foyer** | | | | | | |
| **8:30 - 9:15** | **Keynote #5: Kade Davison** - Maclaurin Theatre 103 | | | | | | |
| **9:15 - 10:15** | | **RO-311** Strength & Condition III | **RO-312** Injury | **RO-313** Exercise Physiology II | | | |
| **10:15 - 10:45** | **P3 Posters** **Morning Tea** | | | | | | |
| **10:45 - 11:30** | | **RO-321** Sport & Exercise Psychology II | **RO-322** Biomechanics I | **RO-323** Exercise Physiology III | | | |
| **11:30 - 12:30** | **Keynote #6: Alice Sweeting *(Sponsor: VX Sport)*** - Maclaurin Theatre 103 | | | | | | |
| **12:30 - 13:30** | **P3 Posters** **Lunch** | **SESNZ AGM** | | | | | |
| **13:30 - 15:00** | | **WS-331** Performance Analysis: Data Visualisation (Workshop: Alice Sweeting) | **RO-332** Biomechanics II | **RO-333** Exercise Physiology IV | | | |
| **15:00 - 15:30** | **P3 Posters** **Afternoon Tea** | | | | | | |
| **15:30 - 16:15** | **Keynote #7: David Pyne** - Maclaurin Theatre 103 | | | | | | |
| **16:15 - 16:30** | **SESNZ Awards** - Maclaurin Theatre 103 | | | | | | |
| **16:30 - 17:00** | **Whakawatea – farewell all delegates (Day 3 Closing) - Maclaurin Theatre 103** | | | | | | |

***Sponsor stalls in Maclaurin MC153 Foyer / Mezzanine & Te Toki A Rata Foyer***

# Session & Presentation Details - Monday 27 November

| Day 1 | 11:00 - 12:00 Parallel Sessions | |
|---|---|---|
| **SO-111** | **Physical literacy** | **Maclaurin Theatre 103** |
| **Chair** | Takemi Sugiyama | **Short Orals (5+1 min)** |

| | Title | Presenter |
|---|---|---|
| - | A measure of physical literacy in adults | Annaleise Naylor |
| - | Study protocol: An ecological dynamics approach to promote physical literacy and well-being of primary school children | Raymond Sum |
| - | Choosing a holistic physical literacy assessment for children and youth | Lisa Barnett |
| - | Development of the Effective Early Childhood Physical Literacy Pedagogue self-report instrument | Jaime Barratt |
| - | Effects of a physical literacy intervention delivered in medical centres | Alexandre Mouton |
| - | Feasibility of implementing the digital Physical Literacy in Children Questionnaire in primary schools: Insights and recommendations | Lisa Barnett |
| - | Community led innovation: Building common goals and a shared understanding of physical literacy | Sam Fenton |
| - | Creating a physical literacy working group charter to guide investment in physical literacy enriching community spaces. | Kate Cadet |

| **SO-112** | **Effects & Scale Up of School Interventions** | **Maclaurin Theatre 101** |
|---|---|---|
| **Chair** | Angeliek Verdonschot | **Short Orals (5+1 min)** |

| | Title | Presenter |
|---|---|---|
| - | The TransformUs primary school effectiveness trial | Jo Salmon |
| - | Learning through moving: A pilot study of TransformUs in an Australian regional setting | Verity Cleland |
| - | TransformUs Saudi Arabia: A multi-stakeholder exploration of perceived barriers and facilitators to implementing a school-based physical activity program | Emiliano Mazzoli |
| - | Feasibility of the TransformUs whole-of-school physical activity program for primary schools in Saudi Arabia | Ana María Contardo-Ayala |
| - | Examining the mediating effects of sleep on older adolescents' mental health: The Burn 2 Learn cluster randomised controlled trial | Angus Leahy |
| - | The mediating effects of self-efficacy on adolescent mental health: Findings from the Burn to Learn cluster randomised controlled trial | Angus Leahy |
| - | Effect of high-intensity interval training on hippocampal volume in older adolescents | Sarah R Valkenborghs |
| - | Acceptability, dose, and fidelity of an activity break intervention for adolescents with disability: Burn 2 Learn adapted (B2La) cluster RCT | David Lubans |

| **SO-113** | **Reviews & More** | **Maclaurin Theatre 102** |
|---|---|---|
| **Chair** | Sarah Kennedy | **Short Orals (5+1 min)** |

| | Title | Presenter |
|---|---|---|
| - | Promotion of muscle-strengthening physical activities in youth sport: A rapid review of evidence | Sarah Kennedy |
| - | The provision and experience of variety in physical activity settings: A systematic review of quantitative and qualitative studies | Narelle Eather |
| - | The role of context as a moderator in the physical activity and cognition relationship across the lifespan | Anthony Okely |
| - | Are psychosocial work environments associated with health-enhancing physical activity and sedentary behaviour at work? A systematic review | Charlotte Brakenridge |
| - | Association between the built environment and obesity and the mediating role of physical activity: a systematic review | Samjhana Shrestha |
| - | Barriers and facilitators to physical activity participation among autistic adults: A scoping review | Vu Ngoc Duong |
| - | Perceived barriers and facilitators to performing regular activity breaks at home in the evening | Jennifer T. Gale |
| - | Footy-FIT protocol: Promoting physical activity and healthy lifestyles in female sports fans | Toby Pavey |

# Monday 27 November (continued)

| SO-114 | School & Community Health | Alan MacDiarmid 102/104 |
|---|---|---|
| Chair | Nicola Ridgers | Short Orals (5+1 min) |

| | Title | Presenter |
|---|---|---|
| - | Stepping up together: The role of community health workers in promoting physical activity in Aotearoa. | Estelle Watson |
| - | What should all health professionals know about movement behaviour change? An international Delphi-based consensus statement | Sjaan Gomersall |
| - | Developing a physical activity 'vital sign' for hospital settings | Christina Louise Ekegren |
| - | Tapuwaekura: An Indigenous approach to promoting wellbeing through activity in the natural environment | Rebecca Thorby |
| - | Revolutionising vocational education through movement | Jessica Orr |
| - | Training a culturally capable future physical activity promotion workforce: Developing postgraduate qualifications in physical activity and hauora/wellbeing (PAH) | Lara Andrews |
| - | Beyond 'brain breaks': a new model for integrated classroom-based active breaks | Natalie Lander |
| - | The Heart Foundation's Energize programme: Enhancing health environments in Te Whanganui-a-Tara primary schools | Patrick McCann \| Noni Shedlock |

| SO-115 | Clinical Populations & Outcomes I | Alan MacDiarmid 103 |
|---|---|---|
| Chair | Nicole Freene | Short Orals (5+1 min) |

| | Title | Presenter |
|---|---|---|
| - | Interventions using wearable activity trackers to improve physical activity and other outcomes in hospitalised adults: A Systematic Review and Meta-analysis | Kimberley Szeto |
| - | Lifestyle management of youth impacted by type 2 diabetes: A systematic review | Kathryn Fortnum |
| - | A scoping review of 5As counselling to promote physical activity to people with non-communicable diseases | Felicity Harpour |
| - | Insights into activities of daily living in heart failure patients: A wearable camera image analysis | Teketo Tegegne |
| - | Impact of ongoing COVID-19 symptoms on physical activity participation in people with type 2 diabetes | Emily Cox |
| - | Utilising step count to compare physical activity between surgical and non-surgical patients with hip-related pain and healthy controls | Denise Jones |
| - | Can an Australian football theme engage men with cardiovascular disease in a physical activity and dietary behaviour change program? Findings from a feasibility randomized trial | Eleanor Quested |
| - | Promoting physical activity as part of a multidisciplinary, blended delivery wellbeing and healthy lifestyle program for people with rheumatoid arthritis | Nicola Burton |

| Day 1 | 12:00 - 13:00 Parallel Sessions | |
|---|---|---|
| RO-121 | Leaders in the Field | Maclaurin Theatre 103 |
| Chair | Matthew 'Tepi' McLaughlin | Regular Orals (8+2 min) |

| | Title | Presenter |
|---|---|---|
| - | Explaining the marked increase in global physical activity publications 1985 to 2022 | Adrian Bauman |
| - | Effectiveness of a sit less, move more program for desk-workers: findings from the national implementation trial of BeUpstanding | Genevieve Healy |
| - | Reporting activity patterns: A modified Delphi study | Nicola Ridgers |
| - | Different analysis methods, same answer? Practical implications of different ways to estimate treatment effects in RCTs | Mitch Duncan |
| - | Aotearoa New Zealand's 2022 Report Card on Physical Activity for Children and Youth | Scott Duncan |

# Monday 27 November (continued)

| RO-122 | Physical Activity & Mental Health | Maclaurin Theatre 101 |
|---|---|---|
| Chair | Angus Leahy | Regular Orals (8+2 min) |

| | Title | Presenter |
|---|---|---|
| - | Te Hekenga Whaiora: A co-designed system of support for the health of young people experiencing first episode psychosis | Matthew Jenkins |
| - | A multi-behavioural home-based Intervention for reducing depressive symptoms at postpartum: The Food, Move, Sleep (FOMOS) randomised controlled trial | Madeleine France-Ratcliffe |
| - | The impact of Green Prescription on sustained physical activity levels, quality of life, and mental health | Kobus Du Plooy |
| - | Association between sports participation and health related quality of life of Australian children: A longitudinal study | Asad Khan |
| - | Association of physical activity and mastery with psychological distress in mid-aged adults over nine years | Adam Novic |

| RO-123 | Early Childhood | Maclaurin Theatre 102 |
|---|---|---|
| Chair | Phoebe George | Regular Orals (8+2 min) |

| | Title | Presenter |
|---|---|---|
| - | Preschool children's physical activity within and outside of the neighbourhood: A latent profile analysis using device-based measures. | Pulan Bai |
| - | Improving physical development in early childhood through the use of the Movement Environment Rating Scale: A cluster randomised trial | Rachel Jones |
| - | Play Active physical activity policy in early childhood education and care: Post-implementation evaluation. | Elizabeth Wenden |
| - | Effect of staff professional development on preschooler`s fundamental motor skills and physical fitness: The ACTNOW cluster randomized controlled trial | Elisabeth Straume Haugland |
| - | Playgrounds and children's health: A scoping review | Jasper Schipperijn |

| WS-125 | Advocacy Workshop | Alan MacDiarmid 102/104 |
|---|---|---|
| Chair | Peter McCue | Workshop |

| | Title | Presenter |
|---|---|---|
| - | Identifying stakeholders in the physical activity systems across the Asia-Pacific region | |

| RO-124 | Clinical Populations & Outcomes II | Alan MacDiarmid 103 |
|---|---|---|
| Chair | Jessica Seymour | Regular Orals (8+2 min) |

| | Title | Presenter |
|---|---|---|
| - | Device-measured physical activity and sedentary behaviour changes in people with hip and knee osteoarthritis: A pilot trial | Rebecca Meiring |
| - | Using rugby league clubs to reduce diabetes risk in overweight and obese men: League-FIT | Toby Pavey |
| - | Device-measured physical activity and cardiometabolic risk factors in children and adolescents: An observational analysis from the SEACO-CH20 study | Jeevitha Mariapun |
| - | If you measure it, it matters! Factors influencing implementation of physical activity promotion in cardiac and pulmonary rehabilitation in Australia. | Nicole Freene |
| - | Effect of a smartphone app on hospital admissions and sedentary behaviour in cardiac rehabilitation participants: ToDo-CR randomised controlled trial | Kacie Patterson |

# Monday 27 November (continued)

| Day 1 | 15:30 - 16:30 Parallel Sessions | |
|---|---|---|
| **RO-131** | **Technology** | **Maclaurin Theatre 103** |
| **Chair** | Corneel Vandelanotte | **Regular Orals (8+2 min)** |
| | **Title** | **Presenter** |
| - | Increasing physical activity using a just-in-time adaptive digital assistant supported by machine learning: A novel approach for hyper-personalised mHealth interventions | Corneel Vandelanotte |
| - | Using automated wearable cameras to categorise the type and context of screen-based behaviours among adolescents: An observational study | George Thomas |
| - | Feasibility and acceptability of a mobile health app to promote physical activity in out of school hours care services. | Linda Patel |
| - | What's important to consider when implementing wearable activity trackers into healthcare? A stakeholder Delphi study. | Kimberley Szeto |
| - | A technology-supported physical education course to increase the physical activity levels of university students: Results from a randomised controlled trial | Kuston Sultoni |
| **RO-132** | **Older Adults I** | **Maclaurin Theatre 101** |
| **Chair** | Emma Adams | **Regular Orals (8+2 min)** |
| | **Title** | **Presenter** |
| - | Trajectories of physical activity and physical function among older women: Data from the Australian Longitudinal Study on Women's Health | Yuta Nemoto |
| - | Goldilocks days: Optimising time-use for older adults | Dot Dumuid |
| - | Perceptions of using micro bouts of vigorous-intensity lifestyle physical activity to increase physical activity in adults transitioning to retirement | Bingyan Pang |
| - | Exercise in disguise: Developing and maintaining engagement in dance for healthy ageing and fall prevention | Heidi Gilchrist |
| - | Impact of light volleyball intervention programme in improving physical attributes of older adults in Hong Kong: Preliminary study | Leung Ka Man |
| **RO-133** | **Inequities & Rural** | **Maclaurin Theatre 102** |
| **Chair** | Emiliano Mazzoli | **Regular Orals (8+2 min)** |
| | **Title** | **Presenter** |
| - | The efficacy and feasibility of the 'Up Your Game' intervention with adolescents living in rural south-east Queensland | John Dennehy |
| - | Individual and socioeconomic factors influencing physical activity among adults living in rural and regional Victoria: A multilevel analysis | Stephen Barrett |
| - | Emergence of socioeconomic inequalities in physical activity across the lifespan in women: 21 years of data from the Australian Longitudinal Study of Women's Health | Wendy Brown |
| - | Moving in the margins: A qualitative study into the role of physical activity in marginalised communities | Matthew Jenkins |
| - | Perceptions of physical activity among youth living in rural Queensland | John Dennehy |
| **WS-134** | **SIG-Scaling Up Physical Activity** | **Alan MacDiarmid 102/104** |
| **Chair** | Harriet Koorts \| Sarah Kennedy | **Workshop** |
| | **Title** | **Presenter** |
| - | Fundamentals of scaling up in physical activity | |
| **WS-135** | **SIG-Physical Literacy** | **Alan MacDiarmid 103** |
| **Chair** | Lisa Barnett \| Pierre Comis | **Workshop** |
| | **Title** | **Presenter** |
| - | Evolution of the focus on physical literacy across Aotearoa New Zealand | Karen Laurie \| Neil Snowling \| Junior Armstrong |

# Monday 27 November (continued)

| Day 1 | 16:30 - 17:30 Parallel Sessions | |
|---|---|---|
| **SO-141** | **Geography & Active Travel** | **Maclaurin Theatre 103** |
| **Chair** | Stephanie Schoeppe | **Short Orals (5+1 min)** |

| | Title | Presenter |
|---|---|---|
| - | Walkability and physical activity in a regional setting: A case study linking geospatial and population health data in Tasmania, Australia | Verity Cleland |
| - | The influence of blue space on physical activity: preliminary findings from an environmental assessment of beaches in the Perth/Peel region in Western Australia | Phoebe George |
| - | "It's a good start to the day": Urban Australian children's understandings of active mobility and place | Himashini Whitley |
| - | Incentivising adult public transport use for physical activity gain: Trips4health - a single-blinded randomised controlled trial | Jack Evans |
| - | Differential roles of population density in walking and cycling: Findings from Greater Tokyo | Takumi Abe |
| - | Identifying cycling behaviour in healthy adults using thigh-worn accelerometry and activity classification algorithms | Claas Lendt |
| - | Joint associations of neighbourhood walkability and greenery with walking among middle-aged and older adults | Manoj Chandrabose |
| - | Walking outdoors and picking up litter to prevent plastic pollution: Does it motivate people to be more active? | Stephanie Schoeppe |

| **SO-142** | **24 hr Movement** | **Maclaurin Theatre 101** |
|---|---|---|
| **Chair** | Tom Stewart | **Short Orals (5+1 min)** |

| | Title | Presenter |
|---|---|---|
| - | Wear-time compliance with a 24-hour accelerometry protocol: Insights from the International Study of Movement Behaviours in the Early Years (SUNRISE) | Anthony Okely |
| - | Associations between postnatal pollution exposures, 24-hour movement behaviours and motor development outcomes among children (0-12 years old): A systematic review | Claudia Maddren |
| - | 24-hour movement behaviour typologies and adiposity in children and adolescents: Identifying "bee-like behaviours" using a bias-adjusted latent profile analysis | David Janda |
| - | Adherence to 24-h activity guidelines among New Zealand adolescents: A sociodemographic analysis | Deborah Telford |
| - | Adherence to WHO 24-hour movement behaviour guidelines and association with socio-demographic factors among Ethiopian preschool children | Anthony Okely |
| - | Physical activity, screen time and dietary behaviours in New Zealand adolescents prior to versus during COVID-19 pandemic | Sandra Mandic |
| - | Understanding adolescent 24-h time use: Age and gender disparities in New Zealand's youth | Deborah Telford |

| **SO-143** | **New Directions in Physical Activity** | **Maclaurin Theatre 102** |
|---|---|---|
| **Chair** | Shirley-Anne Gardiner | **Short Orals (5+1 min)** |

| | Title | Presenter |
|---|---|---|
| - | Potential efficacy of the MOVERS professional development program: A pilot randomised controlled trial | Kalina Kazmierska-Kowalewska |
| - | Associations between excessive and problematic social media use and psychosomatic complaints among adolescents: Does physical activity moderate the associations? | Asad Khan |
| - | UC30 - Co-designed behavioural nudges to reduce university students' sedentary time: a pilot pre-post study | Alice Martin |
| - | Is time really a barrier to regular participation in physical activity, or just an excuse? | Elaine Hargreaves |
| - | Mats, music, and moments of interruption: The role of sensory engagements in yoga | Liz McKibben |
| - | Retention, engagement, and allied healthcare costs during a 'stepped down' physical activity program for military service veterans: The Active Choices pilot study. | Nicholas Gilson |
| - | Intergenerational effects of preconception and prenatal parental physical activity on the brain development of offspring: A scoping review | Sarah Valkenborghs |
| - | The development and evaluation of netball specific high-intensity interval training sessions: The Netball-HIIT study. | Narelle Eather |

# Monday 27 November (continued)

| WS-144 | SIG-School Physical Activity | Alan MacDiarmid 102/104 |
|---|---|---|
| Chair | Narelle Eather \| Nick Riley \| Natalie Lander | Workshop |

| | Title | Presenter |
|---|---|---|
| - | Novel approaches to effective and sustained school-based physical activity: An Aotearoa New Zealand perspective | Chris Chrichton \| Neil Snowling \| Wiremu Mato \| Bec Thorby |

| WS-145 | SIG - Physical Activity in Healthcare | Alan MacDiarmid 103 |
|---|---|---|
| Chair | Sjaan Gomersall \| Nicole Freene | Workshop |

| | Title | Presenter |
|---|---|---|
| - | Get a move on! Lessons from understanding and improving inpatient mobility | Alison Mudge |

| Day 1 | 13:00 - 14:00 Poster Session | |
|---|---|---|
| P1 | Poster Session I | Maclaurin Foyer |

| Poster | Title | Presenter |
|---|---|---|
| 1 | School travel and perceptions of walking to school in New Zealand adolescents prior to versus during the COVID-19 pandemic | Sandra Mandic |
| 2 | Correlates of achieving sufficient physical activity through public transport commuting, in a large Australian city | Anthony Walsh |
| 3 | Influence of parental factors on WHO global guidelines for Japanese children under the age of five: The SUNRISE International Study | Masashi Watanabe |
| 4 | The physical activity environment in Aotearoa New Zealand early childhood education | Wendy Pirie |
| 5 | Pre-pregnancy, prenatal and perinatal predictors of physical activity in Australian children: data from the Mothers and their Children's Health study | Emily Hume |
| 6 | Co-designing a physical activity service for people from refugee and asylum seeking backgrounds | Grace McKeon |
| 7 | 'A Different Ball Game': Engaging men from rural areas in a sport-themed behavioural physical activity and weight management programme | Matthew David McDonald |
| 8 | Development of a physical literacy intervention delivered in medical centres | Alexandre Mouton |
| 9 | Exploring three pedagogical approaches to developing fundamental movement skills in children | Simone Goldrick |
| 10 | Impact of Healthy Active Learning on physical activity of children aged 5-13 years: Measured by accelerometry | Neil Snowling |
| 11 | Impact of the Healthy Active Learning initiative on educational outcomes | Neil Snowling |
| 12 | Impact of Healthy Active Learning on the motivations of physical activity of children aged 5-13 years | Neil Snowling |
| 13 | Moanamana: Connecting watersports with school communities to provide quality physical activity experiences for students as they restore marine ecosystems | Karen Laurie |
| 14 | A qualitative investigation of Australian university students' perceptions of health behaviours and relationships with educational outcomes | Lena Babaeer |
| 15 | Movement behaviours, study load and health outcomes in university students | Kate Ridley |
| 16 | Development of a blended intervention to promote physical activity, health and work productivity for office employees using intervention mapping framework | Yan Sun |
| 17 | Do regular activity breaks performed in the laboratory impact subsequent free living activity patterns? A randomized crossover study. | Meredith Peddie |
| 18 | Domain-specific sedentary behaviours' typologies and total sedentary time among office-based workers: A latent profile analysis | Aino Kitayama |
| 19 | Association of eating behaviour, physical activity, and sedentary behaviour with sleep duration among Japanese workers | Arisa Sumino |
| 20 | A systematic review and meta-analysis of the associations between motor competence and executive functions in children and adolescents | Ran Bao |
| 21 | Exploring contemporary screen time in Australian adolescents: A qualitative study | George Thomas |
| 22 | Perceptions and preferences of physical activity participation in adolescents: An exploratory study | Kazi Ahmed |
| 23 | Adherence to the 24-Hour movement guidelines among Japanese children and adolescents | Sachika Kitada |

# Session & Presentation Details – Tuesday 28 November

| Day 2 | 11:00 - 12:00 Parallel Sessions | |
|---|---|---|
| **EO-211** | **Scale Up & Translation** | **Maclaurin Theatre 103** |
| **Chair** | Scott Duncan | **Extended Presentations** |

| | Title | Presenter |
|---|---|---|
| - | How and if to scale-up a physical activity intervention: A case study of Play Active | Matthew Mclaughlin |
| - | Evaluating a national physical activity initiative to get more Australians moving: Heart Foundation Walking | Elizabeth A Calleja |
| - | Tū Manawa Active Aotearoa: Evaluation of a needs-based activation fund to promote physical activity in local communities | Elaine More |

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|---|---|---|
| **EO-212** | **Geography & Active Transport** | **Maclaurin Theatre 101** |
| **Chair** | Manoj Chandrabose | **Oral Presentations** |

| | Title | Presenter |
|---|---|---|
| - | Spatial patterns of physical activity among Auckland adults experiencing urban regeneration: Preliminary findings from Te Hotonga Hapori | Tom Stewart |
| - | Moving from simple to complex: Creating a systems map to address obesity in the Darling Downs Region | Tracy Kolbe-Alexander |
| - | Are disadvantaged areas more dependent on cars for daily travel? | Takemi Sugiyama |

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|---|---|---|
| **EO-213** | **Exercise Physiology I (Invite: Kade Davison)** | **Maclaurin Theatre 102** |
| **Chair** | Nick Gant | **Oral Presentations** |

| | Title | Presenter |
|---|---|---|
| - | INVITED SPEAKER (40 mins): The Emergence of CEP internationally and learnings from 15+ years of rapid growth in Australia | Kade Davison |
| - | Investigating the feasibility of a supervised, personalised exercise programme, during the first 12-months of primary treatment, for people with cancer | Jessica Allan |

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|---|---|---|
| **EO-214** | **Workplaces** | **Alan MacDiarmid 102/104** |
| **Chair** | Genevieve Healy | **Extended Presentations** |

| | Title | Presenter |
|---|---|---|
| - | Recommendations by teachers for the design of lifestyle interventions for promoting teachers' health and wellbeing in Australia: A Thematic Analysis | Lucy Corbett |
| - | What strategies do desk-based workers use to sit less and move more? Findings from the BeUpstanding National Implementation Trial | Samantha Stephens |
| - | Recruitment, retention, fidelity, and costs of a 'stepped-down' high intensity interval training program for truck drivers: The Fit2Drive cluster-controlled trial | Nicholas Gilson |

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|---|---|---|
| **EO-215** | **Strength & Condition I** | **Alan MacDiarmid 103** |
| **Chair** | Matthew Blair | **Oral Presentations** |

| | Title | Presenter |
|---|---|---|
| - | Under pressure: The chronic effects of lower-body compression garment use during a 6-week military training course | David Edgar |
| - | Advancing the diagnostic value and the acute and chronic effects of Wearable Resistance on the Pro-agility shuttle | James Forster |
| - | Integrating local vibration training into an isometric strength protocol: Acute effects on lower-body isokinetic strength in healthy, active individuals | Hannah Rose Tiedt |
| - | The influence of menstrual cycle phase on kinetic variables and subjective experience of exercise during high-volume bench press cluster sets: A pilot study | Emily Cavell |

# Tuesday 28 November (continued)

| EO-216 | Sport & Exercise Psychology I (Invite: John Sullivan) | Alan MacDiarmid 101 |
|---|---|---|
| Chair | Rich Masters | Oral Presentations |
| | Title | Presenter |
| - | INVITED SPEAKER (40mins): Closing the gap - bringing athletes, coaches, practitioners and researchers together | John Sullivan |
| - | Influence of pressure on conscious motor processing and performance in 'skill-execution only' and 'dynamic' task contexts in soccer penalty shooting | Robyn Sullivan |

| Day 2 | 12:00 - 13:00 Parallel Sessions | |
|---|---|---|
| RO-221 | Indigenous & Pasifika Peoples | Maclaurin Theatre 103 |
| Chair | Geoff Kira | Regular Orals (8+2 min) |
| | Title | Presenter |
| - | Working together to understand First-Nation Australian children's interpretation of a pictorial questionnaire designed to assess physical literacy | Chathurani De Silva |
| - | "He wants to play football but not available here": Parent perspectives of Aboriginal and Torres Strait Islander child physical activity | Rona Macniven \| Brett Biles |
| - | Patterns in physical activity participation among Pasifika adults in Aotearoa New Zealand | Martine Matapo-Kolisko |
| - | The future effectiveness of Indigenous Māori practice considerations on an Aotearoa adolescent-focused, active transport policy intervention: A modelling study. | Tom Bergen |
| - | Working together for children in the Pacific Islands: Current opportunities and perceptions to promoting physical activity and reducing screen time | Sarah T. Ryan |

| Panel-222 | Panel Discussion - Evidence Translation (Sponsor: HPSNZ) | Maclaurin Theatre 101 |
|---|---|---|
| Chair | Dave Adams | Panel |
| | Title | Presenter |
| - | Bridging the gap between sport science research & practice | John Sullivan \| Sue Robson \| Craig Palmer \| Kirsten Spencer |

| WS-223 | Exercise Physiology (Industry Forum) | Maclaurin Theatre 102 |
|---|---|---|
| Chair | Andy Kilding | Workshop |
| | Title | Presenter |
| | Understanding the landscape of the exercise physiology profession in Aotearoa New Zealand | |

# Tuesday 28 November (continued)

| Day 2 | 14:00 - 15:00 Parallel Sessions | |
|---|---|---|
| **SO-231** | **School Interventions** | **Maclaurin Theatre 103** |
| **Chair** | Natalie Lander | **Short Orals (5+1 min)** |

| | Title | Presenter |
|---|---|---|
| - | Development of the Capability, Opportunity, and Motivation to deliver Physical Activity in School Questionnaire (COM-PASQ) for teachers | Angeliek Verdonschot |
| - | Effect of a school-based HIIT intervention on student's cardiorespiratory fitness, muscular fitness, and executive function: Findings from Making a HIIT | Stephanie L. Duncombe |
| - | Feasibility and preliminary efficacy of the 'Muscle Movers' program: A teacher-delivered intervention to support children's muscle-strengthening physical activity participation | Jordan Smith |
| - | The effectiveness of secondary-school based interventions on the future physical activity of Aotearoa New Zealand adolescents: A modelling study | Tom Bergen |
| - | Acceptability, dose delivered, and fidelity of a school-based physical activity leadership program: The Learning to Lead cluster randomised controlled trial | David Lubans |
| - | Exploring the use of game-based approaches to teaching basketball in Chinese primary school physical education: The MASTER pilot RCT | Jin Yan |
| - | Impact of a professional learning workshop on teachers' capability, opportunity, and motivation to teach resistance training in schools | Angeliek Verdonschot |
| - | Comparative effectiveness of physical activity interventions on cognitive function in children and adolescents with neurodevelopmental disorders: A network meta-analysis | Rae R.Y. Tao |

| **SO-232** | **Policy, Implementation & Stakeholders** | **Maclaurin Theatre 101** |
|---|---|---|
| **Chair** | Verity Cleland | **Short Orals (5+1 min)** |

| | Title | Presenter |
|---|---|---|
| - | Translation of research evidence to physical activity (PA) policies: An audit of State (New South Wales, Australia) Government PA policies (2006-2019) | Peter McCue |
| - | Establishing a genuine partnership across cultures, disciplines and sectors to promote wellbeing through physical activity and sport in New Zealand | Erica Hinckson \| Robert Hogg \| Lisa Mackay \| Chien Ju Ting \| Justin Richards |
| - | Challenges and successes of establishing a cross-agency group for promoting national physical activity policy and practice | Jon Saunders |
| - | Whole-of-system approach to population physical activity promotion in British Columbia: Attributes framework and causal loop diagramming to identify leverage points | Lori Baugh Littlejohns |
| - | Delivering change: The role of local government in physical activity promotion | Jessica Lee |
| - | Physical activity grants for community settings: Heart Foundation's Active Australia Innovation Challenge | Elizabeth A Calleja |
| - | A novel approach to articulating the value of physical activity: Social return on investment including an Indigenous worldview | Nicola Gamble |
| - | Physical activity and wellbeing in financially vulnerable young people: Working with non-sport sector partners to improve reach and impact | Rebecca Thorby |

| **WS-233** | **Exercise Physiology (AEP/CEP Future Strategy)** | **Maclaurin Theatre 102** |
|---|---|---|
| **Chair** | Stacey Pine | **Workshop** |

| | Title | Presenter |
|---|---|---|
| - | Shaping the future of the exercise physiology profession in Aotearoa New Zealand | |

# Tuesday 28 November (continued)

| SO-234 | Older Adults II | Alan MacDiarmid 102/104 |
|---|---|---|
| Chair | Sjaan Gomersall | Short Orals (5+1 min) |

| | Title | Presenter |
|---|---|---|
| - | Social support a declining resource for physical activity across 9 years in adults aged 60+ years | Genevieve Smith |
| - | The Exercise Right for Active Ageing study: Participation in community-based exercise classes by older Australians during the COVID-19 pandemic | Christina Ekegren |
| - | Associations between dog ownership and physical function among older adults: Findings from the HABITAT cohort | Emma Adams |
| - | Strategies to boost recruitment of older people to physical activity trials | Courtney Anne West |
| - | Older adults' companions for physical activity: Who, how often and changes over time | Genevieve Smith |
| - | Telephone-based health coaching to increase physical activity in older adults: Key elements for success | Betty Ramsay |
| - | Associations between gardening activity and sleep quality, moderating roles of age and sex | Neville Owen |
| - | Apathy and fatigue, but not depression, associated with physical inactivity in older adults | Fleur Harrison |

| SO-235 | Strength & Condition II<br>(Invite: David Pyne) | Alan MacDiarmid 103 |
|---|---|---|
| Chair | Mark Drury | Short Orals (5+1 min) |

| | Title | Presenter |
|---|---|---|
| - | INVITED SPEAKER (40mins): Monitoring and managing training loads for performance and health | David Pyne |
| - | Automatic assessment of resistance training movement performance using template-based modelling | Rylea Hart |
| - | Coach and athlete perceptions of periodised strength and conditioning for short sprinters | Jeganenthiran Sellathurai |
| - | Effects of three different velocity-based training regimens on deadlift performance in collegiate male and female soccer players | Tanuj Wadhi |

| SO-236 | Female Athletes<br>(Invite: Stephen Fenemor) | Alan MacDiarmid 101 |
|---|---|---|
| Chair | Glenn Kearney | Short Orals (5+1 min) |

| | Title | Presenter |
|---|---|---|
| - | INVITED SPEAKER (40mins): Post-partum return to elite rowing: examples and learnings | Stephen Fenemor |
| - | The acute effect of wearable resistance placement on change of direction performance in elite netball players | Chloe Ryan |
| - | The Low Energy Availability in Female Questionnaire (LEAF-Q) in identifying health markers in elite female rugby 7s players | Joyce Khor |
| - | Influence of the menstrual cycle and body image on female athlete experiences | Rebecca Attwell |

# Tuesday 28 November (continued)

| Day 2 | 13:00 - 14:00 Poster Session | |
|---|---|---|
| **P2** | **Poster Session II** | **Maclaurin Foyer** |

| Poster | Title | Presenter |
|---|---|---|
| 1 | Investigating coaches' strategies in creating motivational climates: A Qualitative study | Shi Yuchen |
| 2 | Addressing the key role of vision in physical activity research and the related health benefits | Bruno Ortega Mira |
| 3 | Muscle contractile inactivity increases proportional to sedentary bout duration | Christian Brakenridge |
| 4 | Effects of physical activity and sedentary behaviour at admission on gait independence at discharge in nonambulatory stroke patients undergoing rehabilitation | Masashi Kanai |
| 5 | Is physical exercise or melatonin supplement more effective to improve sleep quality in children with ASD? | Choi Yeung Andy TSE [HPE] |
| 6 | Development and content validity of the Motivation Assessment Tool for Physical Activity (MAT-PA) among children with autism spectrum disorders | Mi An |
| 7 | Four-metre gait speed: Reliability and normative reference values in community-dwelling healthy adults | Meredith Yeung |
| 8 | Criterion validity of the activPAL accelerometer in people living with cervical dystonia | Irum Yaqoob |
| 9 | Relationship between the amount of questionnaire-assessed physical activity and objective measures determined by triaxial accelerometers among older adults in Japan | Manabu Nakamura |
| 10 | Mobile health for promoting physical activity in schizophrenia: A scoping review | Yusuke Kurebayashi |
| 11 | Effects of a blended indoor and outdoor exercise program on depressive symptoms in Hong Kong older adults: A study protocol | Yanping Duan |
| 12 | The effectiveness of physical activity interventions on undergraduate university students' mental health and wellbeing: A systematic review and meta-analysis | Kevin Huang |
| 13 | Associations of changes in physical activity with the risk of depressive symptoms | Yu-Tai Liu |
| 14 | Physical activity and the social and emotional wellbeing of First Nations people | Rona Macniven \| Brett Biles |
| 15 | Co-Designing a street art walking map to promote physical activity and mental wellbeing | Shirley-Anne Gardiner |
| 16 | A community-wide strategy on older residents to promote physical activity using a new gateway from disaster mitigation fitness | Akio Kubota |
| 17 | Effect of environmental factors on older people's participation in physical exercise | Xiaoting Ou |
| 18 | Development of a questionnaire to assess the determinants of interrupting prolonged sedentary behaviour for older people with disabilities | Natsuki Shimizu |

# Session & Presentation Details – Wednesday 29 November

| Day 3 | 9:15 - 10:15 Parallel Sessions | |
|---|---|---|
| **RO-311** | **Strength & Condition III** | **Maclaurin Theatre 103** |
| **Chair** | Matthew Blair | **Oral Presentations** |

| | Title | Presenter |
|---|---|---|
| - | Strength and power adaptations after a 4-week undulating periodization emphasising long eccentric or concentric durations in rugby sevens players | Jad Adrian Washif |
| - | Automatic assessment of resistance training movement performance using machine learning | Rylea Hart |
| - | Multidimensional approach to monitoring player performance, fatigue, and wellbeing with international rugby players. | Matthew Blair |
| - | Bone health: A focus on jump landings for women | Tracey Clissold |

| RO-312 | Injury | Maclaurin Theatre 101 |
|---|---|---|
| **Chair** | Nick Draper | **Oral Presentations** |

| | Title | Presenter |
|---|---|---|
| - | User perception and acceptance of softshell headgear amongst youth rugby players | Annette Heward-Swale |
| - | Incidence and magnitude of head impacts experienced by female adolescent rugby players across a season of rugby participation | Nicole Spriggs |
| - | Netball players' overall sporting load and injury incidents: Comparison of 2019 and 2022 secondary school championships | Carla van der Merwe |
| - | The association between oculomotor performance and neck muscle function in driving: A narrative review | Fateme Mirzaee |

| RO-313 | Exercise Physiology II | Maclaurin Theatre 102 |
|---|---|---|
| **Chair** | Andy Foskett | **Oral Presentations** |

| | Title | Presenter |
|---|---|---|
| - | Predicting responses to a heat acclimation protocol in trained triathletes | Martyn Beaven |
| - | Effects of systemic versus local hypoxia on post-activation potentiation in elite field hockey players | Betul Coskun |
| - | Enhancing cognitive function and reducing mental fatigue: The impact of acute cocoa flavanol supplementation in severe hypoxia | Nick Gant |
| - | No effects on cycling performance from acute or chronic consumption of New Zealand blackcurrant extract | Carl Paton |

| Day 3 | 10:45 - 11:30 Parallel Sessions | |
|---|---|---|
| **RO-321** | **Sport & Exercise Psychology II** | **Maclaurin Theatre 103** |
| **Chair** | Richard Masters | **Oral Presentations** |

| | Title | Presenter |
|---|---|---|
| - | Psychological and cardiovascular effects of physical activity indoors and outdoors, a cross-over trial | Laura Woolf |
| - | Breaking the cycle - investigating the use of motivational interviewing and cognitive behavioural therapy to reduce recurrence of lower back pain: A randomised controlled trial study protocol | Estelle Watson |
| - | How do runners select their shoes? An in-store experience | Andrew Fife |

# Wednesday 29 November (continued)

| RO-322 | Biomechanics I | Maclaurin Theatre 101 |
|---|---|---|
| Chair | Kim Hébert-Losier | Oral Presentations |

| | Title | Presenter |
|---|---|---|
| - | Ankle starting position influences all calf raise test outcomes | Kim Hébert-Losier |
| - | Biomechanical risk factors associated with anterior cruciate ligament injury and the link to pubertal maturation: A systematic review | Anna Butcher |
| - | Are the LEOMO motion sensors valid to assess maximum seated sprint cycling kinematics, and do kinematic measures relate to performance? | Roné Thompson |

| RO-323 | Exercise Physiology III | Maclaurin Theatre 102 |
|---|---|---|
| Chair | Carl Paton | Oral Presentations |

| | Title | Presenter |
|---|---|---|
| - | The effects of habitual resistance exercise training on cerebrovascular responses to lower body dynamic resistance exercise | Stephanie Korad |
| - | Acute physiological responses of blood flow restriction during recovery in high-intensity interval training in trained cyclists | Carl Paton |
| - | The physical function of retired elite athletes compared to the general population: A preliminary analysis | Clara Scoon |

| Day 3 | 13:30 - 15:00 Parallel Sessions | |
|---|---|---|
| WS-331 | Performance Analysis: Data Visualisation (Workshop: Alice Sweeting) | Maclaurin Theatre 103 |
| Chair | Andy Kilding | Workshop |

| | Title | Presenter |
|---|---|---|
| - | INVITED SPEAKER (90mins): An interactive workshop on analysing and visualising sports data in R | Alice Sweeting |

| RO-332 | Biomechanics II | Maclaurin Theatre 101 |
|---|---|---|
| Chair | Andy Foskett | Oral Presentations |

| | Title | Presenter |
|---|---|---|
| - | Relevance of calf muscle metrics for athletic sprint performance | Kim Hébert-Losier |
| - | A case study exploring the differences in braking demand when descending during road cycling versus mountain biking | Matthew Miller |
| - | Representative testing design – the importance of where testing occurs: A rowing case study | Sarah-Kate Millar |
| - | Maximise or normalise? Examining drop-land-cut distances in youth athletes | Anna Butcher |
| - | The comparison of on-snow to off-snow landings for elite park & pipe freestyle-ski and snowboard athletes | Brittany Smith |
| - | Are super shoes a super placebo? A pilot study in female recreational runners | Kim Hébert-Losier |

| RO-333 | Exercise Physiology IV | Maclaurin Theatre 102 |
|---|---|---|
| Chair | Nick Gant | Oral Presentations |

| | Title | Presenter |
|---|---|---|
| - | Sleep regularity influences sleep duration in professional rugby union athletes | Martyn Beaven |
| - | Development of affordable, ruggedised and portable ECG and respiratory measurements from Movesense Devices | Raul Martin Gomez |
| - | Not your everyday flossing: We're talking muscle tissue | Ryan Overmayer |
| - | Review of associations between sport specialisation and movement competency in youth | Anja Zoellner |
| - | Coaches' perceptions on the impact of a short-sprint coach education intervention | Jeganenthiran Sellathurai |

# Wednesday 29 November (continued)

| Day 3 | 12:30 - 13:30 Poster Session | |
|---|---|---|
| **P3** | **Poster Session III** | **Maclaurin Foyer** |
| **Poster** | **Title** | **Presenter** |
| 1 | Biomechanical effects of head and neck restraint systems for head/neck injury prevention in motorsports: A systematic review | Fateme Mirzaee |
| 2 | Monitoring and confirming menstrual phases | Violet Owans |
| 3 | Quality of reporting in maximal-intent resistance training interventions for older adults: A systematic review | Clare Kennerley |
| 4 | The effects of balance board training with an ageing population | Patrick Lander |
| 5 | The relationship between somatotype and muscle thickness in untrained participants | Helen Ryan-Stew |
| 6 | Effects of an in-season rugby phase on sprint performance in senior college male rugby players | Michael Mann |
| 7 | A comparison of three different work to rest periods during intermittent sprint training | Tim Rogers |
| 8 | Hormone, strength, and power adaptations to a 4-week undulating training programme emphasising long eccentric or concentric durations in rugby sevens players | Jad Adrian Washif |
| 9 | Effects of flywheel eccentric training on chronic knee injuries reconditioning: A case study | Erik Tan |
| 10 | Incidence and magnitude of head impacts experienced by male adolescent rugby players: A two-season comparison | Stefan Henley |

## SESNZ Satellite Workshop – Strength & Conditioning

**Date:** 27 November 2023

**Venue:** New Zealand Campus of Innovation & Sport (NZCIS)

<table>
<tr><th>TIME</th><th colspan="2">WORKSHOP ACTIVITY</th></tr>
<tr><td>8.15am</td><td colspan="2">Train (meet up at Wellington central for those who are looking to take the train)</td></tr>
<tr><td>9.00am</td><td colspan="2">Tour of facilities</td></tr>
<tr><td rowspan="2">9.30am<br><br>4 x 25mins Rotations<br><br>Attendees will get around each rotation<br><br>Snack time 10.30-11am</td><td>Practical Rotation 1<br>Olympic Weightlifting Derivatives<br>- Eske Dost<br>High Performance Gym</td><td>Practical Rotation 2<br>Flywheel Training<br>- John Cronin<br>High Performance Gym</td></tr>
<tr><td>Practical Rotation 3<br>Vald Technology<br>- Mat Blair<br>High Performance Gym</td><td>Practical Rotation 4<br>The Science of Conditioning<br>- Stephen Fenemor<br>High Performance Gym</td></tr>
<tr><td>12.00pm</td><td colspan="2">Conditioning for Cricket – Greg King<br>Conditioning for Netball – Guy Mothersole<br>Green Room</td></tr>
<tr><td>1.00pm</td><td colspan="2">LUNCH</td></tr>
<tr><td>2.00pm</td><td colspan="2">Training for Speed – Simon Chatterton<br>Analysis Bunker</td></tr>
<tr><td>3.00pm</td><td colspan="2">SNACK</td></tr>
<tr><td>3.30pm</td><td colspan="2">Physical Preparation for Rugby World Cup<br>- David Edgar (Samoa Head Physical Performance)<br>Green Room</td></tr>
<tr><td>4.30pm</td><td colspan="2">Recovery Roundtable<br>- Greg King (IPL Cricket) / Stephen Fenemor (NZ Rowing) / Guy Mothersole (NZ Netball)<br>Analysis Bunker</td></tr>
<tr><td>5.15pm</td><td colspan="2">Recovery Room Experience<br>Recovery Studio</td></tr>
<tr><td>6.00pm</td><td colspan="2">Head back to Wellington</td></tr>
<tr><td>6.30pm</td><td colspan="2">Informal Social Drinks<br>The Arborist</td></tr>
</table>

## Venue – Victoria University of Wellington (KELBURN Campus)

University Recreation
clubs | sports | fitness

# TE HAU KORI

## UNIVERSITY RECREATION CONFERENCE PACKAGE

### The Package Includes:

#### FITNESS:

- Access to all fitness spaces
- Access to all Group Exercise classes (including Wednesday 29 November 7.30am Yoga).

#### PICK UP SPORT:

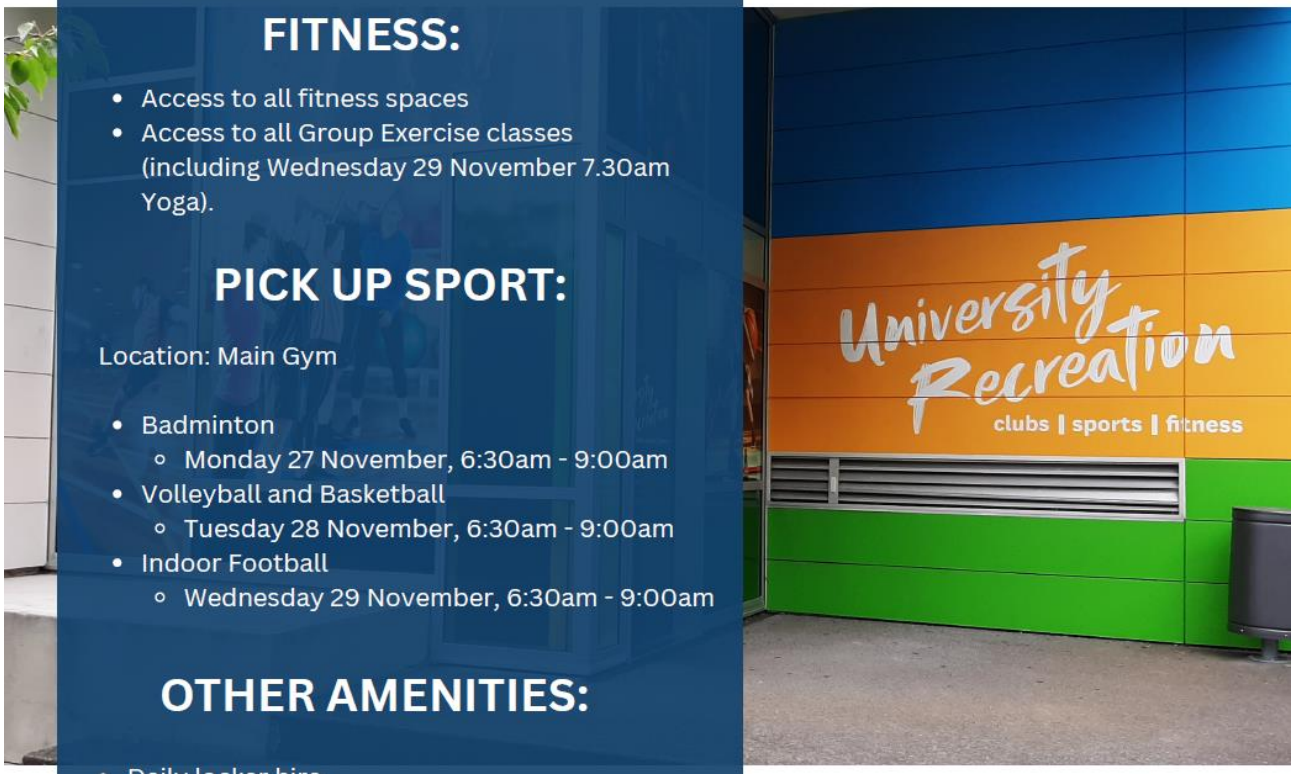
Location: Main Gym

- Badminton
  - Monday 27 November, 6:30am - 9:00am
- Volleyball and Basketball
  - Tuesday 28 November, 6:30am - 9:00am
- Indoor Football
  - Wednesday 29 November, 6:30am - 9:00am

#### OTHER AMENITIES:

- Daily locker hire
- Changing and shower facilities

**COST: $15.00**




VICTORIA UNIVERSITY OF WELLINGTON
TE HERENGA WAKA

University Recreation
clubs | sports | fitness

# CONTACT INFORMATION

**Recreation Centre, Kelburn**

*Phone: 04 463 6614*

**Opening Hours:**

*Monday - Thursday: 6:00am - 10:30pm*
*Friday: 6:00am - 8:00pm*
*Weekends: 9:00am - 6:00pm*

**Pipitea Fitness, Rutherford House**

*Phone: 04 463 6994*

**Opening Hours:**

*Monday - Thursday: 11:00am - 7:00pm*
*Friday: 11:00am - 6:00pm*
*Weekends: Closed*

**Email: university-recreation@vuw.ac.nz**


VICTORIA UNIVERSITY OF WELLINGTON
TE HERENGA WAKA

# ASPA Award Nominees

## ASPA Poster Award

Yan Sun
- *Development of a blended intervention to promote physical activity, health and work productivity for office employees using intervention mapping framework*

Alexandre Mouton
- *Development of a physical literacy intervention delivered in medical centres*

Yusuke Kurebayashi
- *Mobile health for promoting physical activity in schizophrenia: A scoping review*

Masashi Watanabe
- *Influence of parental factors on WHO global guidelines for Japanese children under the age of five: The SUNRISE International Study*

## ASPA Student Award

Annaleise Naylor
- *A measure of physical literacy in adults*

Tom Bergen
- *The effectiveness of secondary-school based interventions on the future physical activity of Aotearoa New Zealand adolescents: A modelling study*

Chathurani De Silva
- *Working together to understand First-Nation Australian children's interpretation of a pictorial questionnaire designed to assess physical literacy*

Stephanie Duncombe
- *Effect of a school-based HIIT intervention on student's cardiorespiratory fitness, muscular fitness, and executive function: Findings from Making a HIIT*

## ASPA Early Career Award

Sarah Valkenborghs
- *Effect of high-intensity interval training on hippocampal volume in older adolescents*

Angeliek Verdonschot
- *Development of the Capability, Opportunity, and Motivation to deliver Physical Activity in School Questionnaire (COM-PASQ) for teachers*

Matthew Mclaughlin
- *How and if to scale-up a physical activity intervention: A case study of Play Active*

**ASPA Overall Award**

Yuta Nemoto
- *Trajectories of physical activity and physical function among older women: Data from the Australian Longitudinal Study on Women's Health*

Sjaan Gomersall
- *What should all health professionals know about movement behaviour change? An international Delphi-based consensus statement*

Takemi Sugiyama
- *Are disadvantaged areas more dependent on cars for daily travel?*

**ASPA Policy / Practice Award**

Elaine More
- *Tū Manawa Active Aotearoa: Evaluation of a needs-based activation fund to promote physical activity in local communities*

Nicola Gamble
- *A novel approach to articulating the value of physical activity: Social return on investment including an Indigenous worldview*

Elizabeth Calleja
- *Evaluating a national physical activity initiative to get more Australians moving: Heart Foundation Walking*

## ASPA Award Assessment & Announcement of Winners

Award nominees in each category were identified by the ASPA Scientific Committee based on the scores received during the blind review process for all submissions.

All presenters nominated for an award will be observed and assessed by two independent judges that have been identified by the ASPA Scientific Committee.

Presenters will be judged against the following criteria:
- Significance & innovation
- Technical proficiency of work (e.g. methods, results, project description, evaluation)
- Discussion & implications
- Aesthetics & communication

Award winners will be announced during the closing ceremony for the ASPA component of the conference on Tuesday 28th November.

## Keynote Speakers

**Dr Anna Rolleston**
Ngāti Ranginui, Ngāi Te Rangi, Ngāti Pūkenga
Managing Director Manawa Ora / The Centre for Health, NZ

**KEYNOTE:**
***Is it co-design or is it not co-design: That is the question.***

**Monday 27th November, 9:30-10:30**

Anna Rolleston is of Ngāti Ranginui, Ngāi Te Rangi and Ngāti Pukenga descent. She originally trained in sport and exercise science, with a PhD in medicine, and is now a leading voice in healthcare in Aotearoa New Zealand. Anna is a recognised practitioner and researcher, who holds various governance roles across the sector. She is managing director of Manawa Ora (The Centre for Health), which specialises in a kaupapa Māori primary care approach to long-term condition management. Anna was founding co-director of Pūtahi Manawa, Healthy Hearts for Aotearoa New Zealand, which is Centre of Research Excellence hosted from the University of Auckland comprising a collective of researchers, health professionals and community organisations focussed on improving health outcomes for Māori, Pacific People and women. Her work is dedicated to combining robust scientific and academic evidence with an understanding that change comes from within, but that people often need a good deal of support to facilitate that change. In all of this work, Anna is a strong advocate of exploring new ways of effectively working together with communities to optimise their health outcomes.

**Professor Amy Sau-ching Ha**
The Chinese University of Hong Kong, China

**KEYNOTE:**
***Creating better policies and environments for children's physical activity by working together with stakeholders across disciplines and roles***

**Monday 27th November, 14:00-15:00**

Children's physical activity, or the lack of, is associated with a myriad of physical and social factors. To generate real, sustainable impact in such behaviours, it is critical to get various stakeholders to work together. In this keynote, I will share our evidence-based, physical activity promotion efforts and experiences in working with interdisciplinary researchers, key influencers of children including parents and school principals, and governmental policymakers. While the engagement of respective parties is important, effective communication and coordination between everyone involved is critical to generating impactful outcomes from policy to practical levels.

Professor Amy Ha is the Associate Dean for Research (2015 – 2023) of the Faculty of Education and formerly the Chairperson (2009–2015) of the Department of Sports Science and Physical Education at the Chinese University of Hong Kong. Her research interests include application of information technology in physical education and sports, family-based physical activity, fundamental movement skills, physical literacy, and teachers' professional development.

**Professor Tony Okely**
University of Wollongong, Australia

**KEYNOTE:**
***The SUNRISE International Study: an example of a large-scale collaboration in movement behaviour research***

**Tuesday 28th November, 9:30-10:30**

The SUNRISE International Study of Movement Behaviours in the Early Years (SUNRISE) involves 64 countries, 47 of which are low- or middle-income. An aim of the study is to provide opportunities for capacity building and to build an international community of researchers. As of June 2023, 40 countries have completed the pilot phase and 10 the main phase of the study. This presentation will summarise the progress to date against the study aims, share learnings on conducting a large-scale collaborative study, and provide insights on successes and challenges in working together across multiple jurisdictions.

Anthony Okely is a Distinguished Professor of Public Health and NHMRC Leadership Fellow in the School of Health and Society at the University of Wollongong, Australia. He also holds an Adjunct Professorship at Western Norway University.

Tony's research focuses on movement behaviours in children, with a particular focus on low- and middle-income countries. He has been involved in the development of movement behaviour guidelines at a national, regional, and global level over the past 15 years. He currently leads an international study of movement behaviours in the early years called SUNRISE, which involves 64 countries, 47 of which are LMICs.

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**Dame Professor Farah Palmer**
Ngāti Maniapoto, Waikato
Massey University, NZ

**KEYNOTE (sponsored by Sport NZ Ihi Aotearoa):**
***"Nāu te rourou, nāku te rourou" (with your basket, and my basket): How can sharing resources and knowledge ensure wellbeing for all?***

**Tuesday 28th November, 15:30-16:30**

Since leaving Piopio, Farah went on to complete a PhD in Sport Sociology and reach the highest echelons in rugby – playing for a decade in the black jersey (1997-2006) and captaining the Black Ferns to 3 World Cup victories. After hanging up her boots, she continued to give back to education and sport (particularly rugby) in a variety of roles. Most recently, Farah became the Chair of the NZ Māori Rugby Board and the first woman on the NZ Rugby Board in 2016, a director of Ihi Aotearoa Sport NZ in 2018 and Deputy Chair of the NZ Rugby Board in 2022. Farah endeavours to use her learnings and networks to influence in sport governance and academia to provide insight gained from her experiences to challenge dominant narratives related to Māori, women and girls, leadership and sport. In 2022 she took on a new role as Pou Ākonga – leading ākonga Māori success initiatives at Te Kunenga ki Pūrehuroa – Massey University within the DVC Māori Office and continues to enjoy being part of a high performing team, and seeing others reach their potential.

**Associate Professor Kade Davison**
University of South Australia, Australia

**INVITED:**
***The emergence of CEP internationally and learnings from 15+ years of rapid growth in Australia***

**Tuesday 28th November, 11:00-11:40**

**KEYNOTE:**
***Role of sport & exercise science practitioners in optimising the benefits of physical activity across the globe***

**Wednesday 29th November, 8:30-9:15**

Kade Davison is an Associate Professor in Clinical Exercise Physiology, a member of the Alliance for Research in Exercise, Nutrition and Activity (ARENA) at the University of South Australia, and is the inaugural chair of the International Confederation for Exercise and Sport Science Practice. He served for over a decade as a Director on the board of the national peak body, Exercise and Sports Science Australia (ESSA), including 3 years as Vice-President and 3 years as President, and was acknowledged as one of the top 25 influencers in Exercise and Sports Science in Australia in ESSA's 25 year history. Kade is an educator, researcher and practitioner in exercise physiology with a particular interest in the investigation of models of care for exercise services internationally, and the translation of research to evidence informed practice. He is passionate about continuing to advance the professions of Exercise Physiology, Exercise Science and Sports Science in Australia and around the world and has an ambition to achieve greater international recognition of the role of exercise in health care models.

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**Dr Alice Sweeting**
Victoria University, Australia

**KEYNOTE (sponsored by VX Sport™):**
***The rise (and application) of data analytics and technology in sport***

**Wednesday 29th November, 11:30-12:30**

**WORKSHOP:**
***Performance analysis: Data visualisation***

**Wednesday 29th November, 13:30-15:00**

Alice has been a Lecturer and Researcher at Victoria University (VU) since late 2016, after completing her PhD with Netball Australia and the Australian Institute of Sport. Alice currently supervises PhD students and is involved in research projects, as part of a strategic partnership between Victoria University and the Western Bulldogs. These sports analytics projects include applying data mining techniques to wearable sensor and skilled output data, to evaluate team-sport matches and training. Alice's key areas of interest include spatiotemporal data analysis, the use of wearable sensors and the complex systems approach to understanding team-sport behaviour. Alice currently teaches into and chairs the Graduate Certificate in Data Analytics for Sport Performance at Victoria University, whereby students learn how to analyse, visualise and interpret sports performance data, using programming languages and analytics.

**Professor David Pyne**
University of Canberra Research Institute for Sport & Exercise, Australia

**INVITED:**
***Monitoring and managing training loads for performance & health***

**Tuesday 28th November, 14:00-14:40**

**KEYNOTE:**
***Managing effective relationships between academia and the sports industry***

**Wednesday 29th November, 15:30-16:15**

Professor David B. Pyne is an adjunct professor at the University of Canberra Research Institute for Sport and Exercise (UCRISE) in Canberra, Australia. Pyne has 30 years' experience as a sports scientist (physiologist), attended four Olympic Games, and is currently involved with both emerging and international athletes and coaches. Pyne's research work in the areas of exercise and the immune system, environmental physiology, and fitness and conditioning for sports (swimming and football), exercise and physical activity is recognised internationally. Pyne has published over 300 peer-reviewed papers, with an H-Index of 93 (Google Scholar), and supervised 27 PhD students to completion. He was Foundation Editor of the International Journal of Sports Physiology and Performance from 2004-2009 and currently serves as a Consulting Editor. A listing in Elsevier's Top 2% of all scientists in 2021 worldwide across all disciplines was repeated in 2022. Pyne is a member of Sports Medicine Australia, Exercise and Sports Science Australia, and a Fellow of the American College of Sports Medicine.

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## Invited Speakers

**Dr John Sullivan**
High Performance Sport NZ

**INVITED:**
***Closing the gap - Bringing athletes, coaches, practitioners and researchers together***

**Tuesday 28th November, 11:00-11:40**

Dr John Sullivan is a Clinical Sport Psychologist, Sport Scientist, and the Head of Psychology for High Performance Sport New Zealand. He has over twenty-five years of clinical and scholarly experience, including working with the New England Patriots in the National Football League (NFL) for sixteen years (2000-2016), coordinating sports science and clinical care.

Dr Sullivan has also held appointments within the English Premier League (EPL), the Football Association (FA), Premier Rugby League, Australian Football League (AFL), and Olympic National teams. In addition, Dr Sullivan was a subject matter expert and consultant for the U.S. elite military within the United States Special Operations Command structure (USSOCOM/SOCOM), the Defense Advanced Research Projects Agency (DARPA), and the National Aeronautics and Space Administration (NASA), as well as within domestic and international law enforcement agencies advising on both welfare and performance needs.
Dr Sullivan is currently a visiting scholar of Biomedical Sciences, Psychology, Neuroscience, and Exercise and Nutrition Science at the Queensland University of Technology in Brisbane, Australia. He has also served as an Instructor/Supervisor for Brown University Medical School Sports Medicine Fellowship/Residency and the University of Rhode Island Doctoral Program in Clinical Psychology and Neuroscience.

**Dr Stephen Fenemor**
High Performance Sport NZ, Rowing New Zealand

**INVITED:**
***Post-partum return to elite rowing: examples and learnings?***

**Tuesday 28th November, 14:00-14:40**

Dr Stephen Fenemor is a Performance Physiologist currently working for High Performance Sport New Zealand and Rowing New Zealand providing sports science support for elite crews leading into the Paris Olympic Games. He has previous experience working with the NZ rugby sevens program and many smaller national sporting organisations during preparations to compete in the heat at the Tokyo Olympic Games. His main area of expertise is the implementation of preparation and recovery strategies to enhance athletic performance whilst competing in challenging environmental conditions.

## Panel Discussion – Evidence Translation

**Title:** ***Bridging the gap between sport science research & practice***

**Session Description (sponsored by High Performance Sport New Zealand):**
An open discussion with cross-sectoral experts in sport science on the barriers and facilitators to the translation of research into practice. Although the session will focus on high performance sport, it will cover principles that are relevant to broader population groups and settings.

**Panelists:**

| | |
|---|---|
| Dave Adams (Chair) | - Sport New Zealand Ihi Aotearoa |
| Kirsten Spencer | - Auckland University of Technology |
| Sue Robson | - High Performance Sport New Zealand |
| John Sullivan | - High Performance Sport New Zealand |
| Craig Palmer | - High Performance Sport New Zealand |

## Exercise Physiology (Industry Forum)

**Title:** ***Understanding the landscape of the exercise physiology profession in Aotearoa New Zealand***

**Session Description:**
Hear from industry leaders across a wide spectrum of exercise physiology clinical practice in New Zealand. These professionals will talk about their practice/business model, typical clients, funding and sector information, and be ready to answer any questions you may have about the industry.

## Exercise Physiology (AEP/CEP Future Strategy)

**Title:** ***Shaping the future of the exercise physiology profession in Aotearoa New Zealand***

**Session Description:**
Any practitioners, stakeholders, or interested parties are welcome to discuss the future of exercise physiology as a clinical practice in New Zealand. What does the industry look like now, what is the ultimate outcome for our industry in 5 years, and what are the next steps to make this ideal future a reality? Be prepared to discuss, share your thoughts and shape the direction we take our exercise physiology programs.

## ASPA Advocacy Workshop

**Title:** ***Identifying stakeholders in the physical activity systems across the Asia-Pacific region***

**Session Description:**
A vital element of a systems approach to physical activity is identifying actors (organisations) in the Asia-Pacific that have influence on physical activity. This is a critical starting place to expand ASPA's footprint through physical activity advocacy, partnerships and communications in the region. Participants will work together to identify key Asia Pacific physical activity advocacy contacts and help create a draft 'PA actor' list that will be utilised in future workshops to develop a systems map of regional PA actions and actors. The workshop is open to anyone with an interest in advocacy, including early career researchers.

## ASPA Special Interest Group (SIG) - Scaling-Up

**Title:** ***Fundamentals of scaling up in physical activity***

**Session Description:**
The session is aimed at individuals interested in scaling up, population physical activity promotion and research-practice translation. The objective of the session is to provide participants with information on the basics of scaling up, drawing on both scientific evidence and practice experience. This will assist in developing knowledge needed to undertake and evaluate their own efforts to scale interventions in the future. Key topics include: 1) Definitions and tools for scaling up; 2) example scaled interventions; 3) factors related to scale up; 4) stakeholder engagement; 5) designing a scale up project.

**Session Programme:**
1. Introduction to Scaling-Up SIG and session - Harriet Koorts, Sarah Kennedy (15 minutes)
2. Workshop: Scaling-up physical activity - small group activities (45 minutes)

## ASPA Special Interest Group (SIG) - Physical Literacy

**Title:** ***Evolution of the focus on physical literacy across Aotearoa New Zealand***

**Session Description:**
Sport NZ Ihi Aotearoa will present on the work they have done over the last few years to develop an understanding of physical literacy and embed it within the suites of programs and services offered. The evolution of this work has reached a point that it underpins the Sport NZ Ihi Aotearoa strategy and is embedded within every effort to increase participation in sport and physical activity. This session will take participants on a journey to understand the evolution of the New Zealand approach to physical literacy and showcase how it comes to life across the business, and in turn, the broader sector. The aim is to highlight the nuanced approach to promoting physical literacy and activating in a 'business as usual' manner across a range of programs and services.

**Session Programme:**
1. Introduction to the physical literacy SIG and session - Lisa Barnett, Pierre Comis (10 minutes)
2. Presentation: The physical literacy journey in Aotearoa New Zealand - Karen Laurie, Neil Snowling, Junior Armstrong (35 minutes)
3. Q&A Session and Discussion - SIG leadership and presenters (15 minutes)

## ASPA Special Interest Group (SIG) - School

**Title:** ***Novel approaches to effective and sustained school-based physical activity: An Aotearoa New Zealand perspective***

**Session Description:**
This session will showcase two initiatives from Aotearoa New Zealand-based that aim to improve the physical activity, wellbeing and education outcomes of all school / kura students (Healthy Active Learning & Mātaiao). The session will showcase the importance of practice informed research, the need for authentic collaboration and co-design with the end users, and the alignment with education and wellbeing agendas. The session is relevant to anyone who is working in or with schools / kura.

**Session Programme:**
1. Introduction to Schools SIG and session - Narelle Eather (10 minutes).
2. Presentation: Healthy Active Learning: New Zealand's commitment to the wellbeing agenda and repackaging the value proposition of sport and physical activity to education - Presenters: Chris Chrichton, Neil Snowling (20 minutes)
3. Presentation 2: Mātaiao: Te Ao Māori approach through whakapapa and matauranga Māori to connect tamariki (children) to te taiao (the environment) through Kura (schools) for better health and wellbeing outcomes - Wiremu Mato, Bec Thorby (20 minutes)
4. Q&A Session and Discussion - Nick Riley, Natalie Lander and presenters (10 minutes)

## ASPA Special Interest Group (SIG) - Healthcare

**Title:** ***Get a move on! Lessons from understanding and improving inpatient mobility***

**Session Description:**
This session is designed for health professionals, researchers and policy makers with an interest in improving mobility and reducing functional decline in our hospitals. Hospitals should be places of healing, but low mobility is endemic and its causes multifaceted and complex. There is increasing recognition that 'simple' solutions often considered in clinical trials (e.g. increasing minutes of physiotherapy time) are unlikely to address these complex barriers and create sustainable change. An increased interest in implementation science as a way to recognise and address the complex patient, staff, team and institutional barriers to inpatient mobility has led to more systematic approaches which show promise in improving mobility and outcomes. This presentation will discuss the problem of low inpatient mobility and why it occurs and consider common features and challenges of system-level approaches to improvement in Australia and internationally, including a discussion of the Eat Walk Engage program.

**Session Programme:**
1. Introduction to Healthcare SIG and session - Sjaan Gomersall, Nicole Freene (10 minutes)
2. Presentation: Understanding and addressing the challenge of in-hospital mobility from a patient, health professional and organisational perspective - Alison Mudge (35 minutes)
3. Q&A Session and Discussion - Sjaan Gomersall, Nicole Freene, Alison Mudge (15 minutes)

## ASPA Early Network Event

Meet other early career professionals, join the selfie-challenge, and take the chance to explore the host University and Wellington area. Through this event, you will enhance your understanding of Māori culture, get moving, and connect with other conference attendees.

# ABSTRACTS - ORAL PRESENTATIONS

## Physical Literacy

### A measure of physical literacy in adults

Naylor, A.[1], Flood, A.[1], Barnett, L.[2], Keegan, R. [1]

[1]*University of Canberra*
[2]*Deakin University*

**Introduction.** Physical literacy is a holistic concept relating to an individual's capacity to live a physically active and healthy lifestyle across the lifespan. Our understanding of physical literacy as a lifelong journey is hindered by a lack of valid measurement for adult populations. To address this problem, we aimed to create a holistic measure of physical literacy applicable to adults. **Methods.** A sample of 1,180 adults answered a series of existing questionnaires on aspects of perceived physical literacy. When then conducted exploratory and confirmatory factor analysis to reduce the number of items and create a holistic measure of physical literacy. **Results.** We reduced the items to a 23-item six factor model, which had good fit to the data in both the exploratory analysis ($\chi^2$ (130) = 254.770, p<0.001; TLI = 0.965; RMSEA = 0.040 (95% CI: 0.031, 0.049) and confirmatory analysis ($\chi^2$ (130) = 252.005, p<0.001; TLI = 0.957; RMSEA = 0.046 (95% CI: 0.036, 0.056)). The resulting subjective measure, the Physical Literacy in Adults Scale (PLAS), is a single psychometric measure applicable to adults aged 18-75 years. **Conclusions.** The PLAS covers four domains (physical, psychological, social and cognitive) of physical literacy to provide a holistic physical literacy outcome. The PLAS is a valid and reliable way to assess adult physical literacy, providing an important first step in understanding physical literacy as a lifelong journey including its relationship to physical activity and health.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Study protocol: An ecological dynamics approach to promote physical literacy and well-being of primary school children

Sum, R.[1]

[1]*Chinese University of Hong Kong*

**Purpose.** The research team has found that very little is known about the impact of an Ecological Dynamics (ED) intervention on primary school children's physical literacy and well-being in the Hong Kong context. The aim of this project is therefore to introduce a physical literacy and well-being framework through an ED intervention that allows primary school children to develop good physical activity (PA) and daily behavioural habits. The levels of physical activity (PA) among primary school students in Hong Kong and in other developed nations are below the levels that are sufficient to promote health. Based on the unique physical literacy journey and lifestyle of different individuals, the proposed project would offer the primary school children a meaningful way to achieve active lifestyle development and encourage them to realize their physical literacy journey in later life. **Project Description.** A four-arm (cluster) randomized controlled trial will be employed in this proposed project. An ED intervention will be conducted for six months in primary schools located in each of the 18 administrative districts of Hong Kong. Four classes in senior primary students (grade 4-6) at each school will be randomly assigned to the four different conditions. These participating schools will be equipped with sit-stand desks, PA recess facility and equipment, and sleep pillows. The research team will adopt both objective measures (aerobic fitness, fundamental movement skills, daily behaviour - physical activity, and cognitive function) and self-reported measures (perceived physical literacy, quality of life, sleep quality) covering the elements and domains of physical literacy and well-being to examine the effects of ED interventions. **Conclusions.** The proposed project therefore adds to the current literature by proposing an ED intervention and provides insight into the benefits of sit-stand desks combining PA recess and daytime sleepiness in Hong Kong primary schools. This proposed project can facilitate interaction among primary school children, their teachers (not restricted to PE teachers), and parents to promote mutual understanding of the importance of active lifestyles and well-being of our younger generations.

### Choosing a holistic physical literacy assessment for children and youth

Barnett L.[1], Jerebine, A.[1], Keegan, R.[2], Watson-Mackie, K.[1], Arundell, L.[1], Ridgers, N.[3], Salmon, J.[1], Dudley, D.[4]

[1]*Deakin University*
[2]*University of Canberra*
[3]*University of South Australia*
[4]*Macquarie University*

**Introduction.** Many new tools are designed to assess physical literacy, but it is unclear which align with a holistic framework and are also feasible for use in schools. **Methods.** This systematic review was conducted in accordance with the PRISMA statement. Reviews of physical literacy assessments in the past five years (2017+) were used initially to identify assessments. Then, a search in six databases was conducted for assessments missed/or published since these reviews. Instruments were classified against the Australian Physical Literacy Framework (APLF) and needed to have assessed at least three APLF domains (i.e., psychological, social, cognitive, and/or physical). Feasibility in schools was documented according to time, space, equipment, training, and qualifications. **Results.** Nine instruments were identified from eight reviews. A total of 375 papers were initially identified from the database search, and after screening, 39 papers were relevant to physical literacy assessment. Fourteen instruments are included in our synthesis (nine from prior reviews and five from the updated search). In eight assessments the environmental context was referred to, or inherent. The instrument which assessed the most elements of the APLF was the Physical Literacy in Children Questionnaire (PL-C Quest), designed to map to the APLF and therefore assessed the 30 APLF elements. Passport for Life (PFL, n = 20), the Physical Literacy self-Assessment Questionnaire (PLAQ, n = 18 elements) and the Adolescent Physical Literacy Questionnaire (APLQ, n = 11) assessed the next highest number of elements and all four domains of the APLF. Survey-based instruments were the most feasible to administer in schools with the shortest being the Perceived Physical Literacy Inventory (PPLI) and PL-C Quest. The physical domain was the most assessed overall (n = 65), followed by the psychological (n = 53), cognitive (n = 29) and social (n = 19). **Conclusions.** A number of tools are holistic. While survey-based instruments were the most feasible, a comprehensive assessment may arguably require objective measures for elements in the physical domain.
**Conflict of Interest.** This review was supported by funding from the Australian Sports Commission. The Australian Sports Commission funded development of the APLF (three authors were involved) and the PLC-Quest (four authors were involved).

**Development of the Effective Early Childhood Physical Literacy Pedagogue self-report instrument**

Barratt, J. [1], Cairney, J. [1]

[1]*University of Queensland*

**Introduction.** Given the large amount of time children spend sedentary in centre-based Early Childhood Education and Care (ECEC) services, Early Childhood Educators (ECEs) within this setting become responsible for promoting children's engagement in a whole range of human movement behaviours (Martyniuk and Tucker, 2014). Thus, ECEs need to possess certain skills, knowledge, and practices that foster young children's PL. However, there is no conceptualisation which identifies the significant competencies that make ECEs, what we are calling the Effective Early Childhood PL Pedagogue (ECE-PLP), while considering the identity and profession of an ECE. Further, there are no measures which evaluate ECEs' pedagogy related to PL. Therefore, we sought to first develop a conceptual model theorising the ECE-PLP, and develop a self-report instrument that assesses three constructs relevant to effective pedagogues: (1) PL Capabilities, (2) Knowledge of PL, and (3) Practices to promote PL. **Methods.** We employed systematic instrument development methods that consisted of two steps (Boateng et al., 2018). The conceptual model was developed based on findings from early childhood research surrounding PL, physical activity, and active play. The initial item pool of 82 items were generated following this model. The content validity of this item pool was evaluated through two rounds of expert agreement. Content validity ratio (CVR) was calculated for each item to assess expert agreement, and items were retained, revised, or eliminated based on the minimum CVRcritical value relative to panel size, while also considering expert comments (Ayre & Scally, 2014). **Results.** The conceptual model posits that knowledge and embodiment of PL, when combined with ECEs' professional identity and play-based pedagogy, deliver three measurable constructs. During the content validity study, thirteen experts participated in the first round, which led to 57 items. Ten experts participated in the second round, which led to a final pool of 51 items. **Conclusions.** This study represents the first step in the development of a robust instrument and allows for the final items to be pre-tested in a subsequent study.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Effects of a physical literacy intervention delivered in medical centres**

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**Introduction.** Physical Literacy (PL) can be summarized as a holistic approach for physical activity (PA) engagement (Cornish & Al., 2020). Significant health benefits can be associated with the promotion of PL for adults (Edwards, 2017). Following the development of an assessment tool for PL specifically targeting an adult population with chronic disease, our study sought to find out the effect of successive PL interventions by a physical educator in a medical centre on the PL level of patients. **Methods.** A quantitative, within-subject design was conducted. PL program adhesion was promoted by doctors or physiotherapists of the medical centre. Volunteered patients took part in two PL assessments and counselling meetings with a specialized physical educator. Following a general anamnesis including the Ricci-Gagnon physical activity questionnaire, PL scores were calculated based on a new assessment tool design, consisting of a 40-item questionnaire and 4 physical tests; and divided into the 4 domains of PL (psychological, social, cognitive, physical). Automated feedback was given immediately to the patient after the assessment. Following a motivational interviewing technique, results were discussed with the patient leading towards appropriate SMART individual goals to be set. **Results.** A total of 108 patients with at least one chronic disease (71% female, 56±15 years) underwent assessment 1, with 46 patients (74% female, 61±13 years) completing assessment 2 (46 days later on average). Significant improvements were demonstrated for the overall PL score ($p<0.001$) as well as the cognitive ($p=0,001$) and physical domains ($p=0,032$). No significant changes were found for the psychological and social domain. Additionally, no significant difference in changes were found based on age, sex or nature of the chronic disease. **Conclusions.** This pilot-study was a first attempt to measure and evaluate the significance of changes in PL scores for a population of adults with chronic disease. If the validation of this developed assessment tool requires more research, results show promising effect of an intervention by ongoing support of PL on the domains and overall scores of PL.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Feasibility of implementing the digital Physical Literacy in Children Questionnaire in primary schools: Insights and recommendations**

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**Introduction.** Understanding how children perceive their physical literacy is important to help inform programs to support children develop physical literacy, thereby increasing a child's chance of being physically active for life. We aimed to assess the feasibility of the digital version of the Australian Sports Commission's (ASC) Physical Literacy in Children Questionnaire (PL-C Quest) for implementation in a school environment. **Methods.** Two schools, one regional and one metropolitan, were recruited. A mixed-methods approach was used; teachers completed a feasibility survey, and interviews with teachers and students were conducted. Data were analysed through thematic analysis and descriptive statistics. **Results.** In total, 383 Year 1-6 students completed the digital PL-C Quest. Feasibility surveys were completed by 14 teachers, and 5 teachers and 20 students were interviewed. In one school, the Physical Education teacher implemented the digital PL-C Quest across all classes, whereas in the other school classroom teachers implemented the questionnaire. All teachers were satisfied (67%) or very satisfied (33%) with their experience with the digital PL-C Quest, citing simplicity, efficiency and ease of access for students. Students enjoyed completing the digital PL-C Quest (85%), found it easy to use (70%), and stated that they would be happy to do it again (95%). All teachers found the digital PL-C Quest results clear, and the majority (71.4%) found the results useful to their role. However, some teachers noted that they would have liked more information about physical literacy and how to interpret the results. Most (83%) teachers would recommend the digital PL-C Quest to others and would use it again themselves. **Conclusions.** Our findings provide evidence to support the feasibility of implementing the digital PL-C Quest in Primary School teachers found it suitable for use in a classroom environment and the results useful. The digital PL-C Quest was enjoyable for students, easy to implement, and insightful for teachers. To support effective implementation, it is recommended to develop accompanying professional development resources on physical literacy for teachers.
**Conflict of Interest.** This research was supported by funding from the ASC. The ASC funded development of the PL-C Quest. Four authors (LMB, RK, JS, DD) were involved in developing the PL-C Quest.

**Community led innovation: Building common goals and a shared understanding of physical literacy**

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**Purpose.** It can be difficult for community groups to navigate the concept of physical literacy, and what it means in their local context. By listening to the community and engaging a wide range of stakeholders, it is possible to develop common goals and create a shared understanding of physical literacy to inform community-led innovation. **Project Description.** ***Development.*** Latrobe Health Assembly Physical Literacy Working Group commissioned the Collaborative Evaluation Research Group at Federation University to scope physical literacy in Latrobe Valley, Victoria, Australia. The scoping project aimed to provide recommendations to move the group forward based on the co-creation of new knowledge with key stakeholders from health promotion, physical activity, education, sport, recreation, recreation planning, and the Latrobe Valley community. ***Implementation.*** An appreciative inquiry method was used throughout the project, and the approach taken was inspired by Paulo Freire, co-creating literacy with participants by using their words as the building blocks for learning, creation and action. Appreciative inquiry methodology explores possibilities with participants creating energy and momentum. This research project included: Ten Interviews with stakeholders; Three workshops with the project staff, related agencies, and community members; Development and administration of a community survey; Evaluation report and presentation and dissemination of evaluation findings and recommendations. ***Evaluation.*** Quantitative and qualitative analysis of the community survey and thematic analysis of the stakeholder interviews were summarised into key recommendation for the Physical Literacy Working Group. Key recommendations included: Develop a charter and identity for the Physical Literacy Working Group; Develop messaging to the community and stakeholders based on the charter; Develop a workshop to educate the community and stakeholders. ***Dissemination.*** The working group has developed a charter from the report, adopting all twelve recommendations for implementation. Two journal articles are currently being developed from the report and data collected with approval from the Federation University Human Research Ethics Committee. **Conclusions:** 100 per cent buy in from a community group to build evidence for practical physical literacy outcomes is a challenging task. The success of this project speaks for the efficacy of working with local researchers to conduct community evaluation using appreciative inquiry.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Creating a physical literacy working group charter to guide investment in physical literacy enriching community spaces

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**Purpose.** The Latrobe Health Assembly Physical Literacy Working Group aims to build community capacity to create positive change and lifelong habits toward an active lifestyle. To guide our work we created a Physical Literacy Working Group Charter, using a codesign approach that took into consideration the movement voices of the community, people with lived experience, and local agencies. We are using the Charter to help build a shared understanding of physical literacy across the Latrobe Valley community. Our working group put a significant amount of time and effort into understanding physical literacy, looking at the research, and learning what is happening in this space globally. We know that physical literacy is about building the skills, knowledge, and behaviours to lead active lives, but we need more people to understand that physical literacy applies to any physical activity, not just sport. **Project Description.** In late 2022, our physical literacy working group engaged a local university to conduct a scoping project, because we were struggling to move some of our initial concepts forward. The scoping work involved a series of interviews with diverse groups and emphasised the importance of building strong partnerships and listening to the community. The first recommendation from the university report was to develop a charter and identity for the physical literacy working group. Developed over 2 months, our Charter took inspiration from the ASPA physical literacy special interest group, defined our core values, the way we would approach our work, and the scope and boundaries of the work we fund. The Charter ensures our physical literacy project focus meets the diverse needs of our community, and that everyone has an opportunity to participate in activities that are right for them. **Conclusions.** Our Charter has been endorsed by experts from around the country and the world, through a series of collaborative conversations we had last month. Our Charter outlines to our partners how we want to move project work forward to create an informed, empowered, and confident Latrobe Valley community that participates in regular physical activity.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

## Effects & Scale Up of School Interventions

### The TransformUs primary school effectiveness trial

Salmon, J.[1], Timperio, A.[1], Lander, N.[1], Koorts, H.[1], Lonsdale, C.[2], Ridgers, N.[3], Lubans, D.[4], Bauman, A.[5], Telford, A.[6], Barnett, L.[1], Lamb, K.[7]

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**Introduction.** Efficacious school-based physical activity (PA) initiatives are rarely adapted for implementation at scale. TransformUs is an efficacious behavioural and environmental intervention for increasing children's PA and reducing sedentary behaviour in school and home settings. The aim of this study was to test the effectiveness of the TransformUs program on promoting children's PA and reducing sedentary time in a sub-sample of schools when implemented at-scale to all primary schools in Victoria, compared with control schools in New South Wales, Australia. **Methods.** In collaboration with 17 partners in total, TransformUs was implemented at scale between mid-2018 and the end of 2023. The objective was to recruit 20 urban and regional matched primary schools from Victoria and NSW (as controls). Children in grades 3 and 4 wore an accelerometer for 1 week at baseline, 12- and 24-months. Primary outcomes were children's daily average minutes in moderate-vigorous PA (MVPA) and sedentary time. Height, weight and waist circumference (WC) were assessed at baseline and 12-months with body mass index (BMI) z-scores and WC as secondary outcomes. Linear mixed effects models were fitted to compare outcomes between intervention and control participants accounting for clustering of children within schools, confounding and random effects. **Results.** Twenty-one primary schools were recruited in Victoria (72% government, 65% urban) and 19 in NSW (42% government, 92% urban). A total of n=725 (50% girls, 43% grade 4) intervention children and n=493 (49% girls, 52% grade 4) control children provided valid accelerometer data at baseline. There were no significant effects on children's daily mins sedentary time at 12- or 24-months, or on BMI z-scores or WC at 12-months. At 12-months, there was an unfavourable intervention effect on children's daily mins MVPA (-4.86, 95%CI: -8.77, -0.95, p=0.015), with no effect at 24-months. **Conclusions.** Unlike the efficacy trial, there were no significant effects of the TransformUs intervention when adapted and delivered under 'real world' conditions. It is highly likely that the COVID-19 school lockdowns impacted the implementation of the program; Victorian school children experienced 267 days of home schooling in 2020-2021 and home-based data collection occurred at 20 of the 21 intervention schools.

**Learning through moving: A pilot study of TransformUs in an Australian regional setting**

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**Introduction.** TransformUs is a school-based program developed by Deakin University, Victoria to decrease sedentary behaviour (SB) and increase physical activity (PA) amongst primary school students. In 2021, the Tasmanian Department of Health invited primary schools to pilot TransformUs. The study aim was to evaluate the Tasmanian adoptability and adaptability of TransformUs. **Methods.** Using mixed methods, TransformUs implementation and program satisfaction was evaluated, with data collected in 2022 and follow-up planned late 2023. In 2022, 15/27 TransformUs schools (recruited via principal networks) provided baseline data with 18 staff completing a survey. Survey questions asked about respondents' characteristics; PA in the school; enablers/barriers to increasing students' PA/reducing SB; and reasons for piloting TransformUs. Semi-structured telephone interviews (one written response) occurred with seven survey completers. Three interviews with Tasmanian stakeholder organisation representatives focused on TransformUs implementation. Survey data were analysed descriptively and interviews thematically analysed. **Results.** Survey participants were predominantly experienced teachers (median years 16, range 6:40), half were principals (n=9) and almost half (n=8) had university-level physical education (PE) qualifications. PA was a top priority in 44% of schools. Most (94%) schools offered fee-free PA opportunities outside of structured PE/school sport and had PA related- policies (72%). Schools were generally well equipped for PA but 50% did not have all-weather facilities. PA during recess/lunch was commonly encouraged but mostly student initiated. Participants mostly felt confident to increase students' PA and reduce SB in class but less so when situated within homework. The top reasons for piloting TransformUs were: improve educational outcomes (78%), increase school recognition/profile (61%), access professional development for teachers (61%) and increase students' concentration/focus (61%). Survey and interview responses indicated that leadership and resourcing were perceived as key TransformUs enablers and key barriers were lack of PA infrastructure and a full curriculum. TransformUs was expected to be positively received by the school community. **Conclusions.** TransformUs was viewed as a positive initiative and perceived to favourably influence students' academic engagement and teachers'

professional development. However, barriers like lack of PA infrastructure and a full curriculum need to be overcome.
**Conflict of Interest.** The authors declare no conflict of interest.

### TransformUs Saudi Arabia: A multi-stakeholder exploration of perceived barriers and facilitators to implementing a school-based physical activity program

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**Introduction.** Childhood physical inactivity is a public health concern in Saudi Arabia. This study aimed to investigate the perceived barriers and facilitators to adopting TransformUs, a successful evidence-based whole-of-school physical activity program, in Saudi Arabian primary schools. **Methods.** One-on-one semi-structured interviews were conducted with teachers and school leaders from two single-sex public primary schools in Riyadh, and representatives from relevant stakeholder organisations (e.g., Ministry of Education). The interview questions were developed based on the framework by Proctor et al. (2011) and focused on aspects related to the demand, acceptability, implementation, and sustainability of the program, as well as the perceived cultural barriers and facilitators. Four stakeholders, three school leaders, and six teachers were recruited for the study. The 13 interviews (30-40 minutes long) were audio recorded, transcribed, translated into English, and analysed using thematic analysis with NVivo software. **Results.** The findings revealed several barriers were identified, including financial constraints, inadequate infrastructure, large class size, and concerns about parental support. Significant challenges were also identified in relation to cultural perceptions of appropriateness, excessive teacher workloads, and time management. However, participants recognised the potential benefits of active strategies, such as improved academic performance, student well-being, and teacher satisfaction. Some participants perceived active strategies to be more appropriate for boys than girls, although this was based on the belief that boys enjoy/need movement more than girl (perhaps because girls have fewer opportunities and dedicated infrastructures to be active). Amongst the most relevant facilitators, participants mentioned the importance of a whole-of-school approach, in which the need to encourage students' physical activity is seen as a priority and supported by parents, teachers, school leaders, and the government. Participants also recognised the need for professional development, appropriate equipment, and a built environment that encourages movement as important to the successful implementation of TransformUs in Saudi Arabian schools. **Conclusions.** This study provides insights on the barriers, facilitators, and contextual factors that may influence the implementation of TransformUs in Saudi Arabian primary schools. These findings can be used to guide policy decisions and inform the adaptation or development of effective strategies to promote physical activity among schoolchildren in Saudi Arabia.
**Conflict of Interest.** The authors declare no conflict of interest.

### Feasibility of the TransformUs whole-of-school physical activity program for primary schools in Saudi Arabia

Salmon, J.[1], Timperio, A.[1], Lander, N.[1], Koorts, H.[1], Lonsdale, C.[2], Ridgers, N.[3], Lubans, D.[4], Bauman, A.[5], Telford, A.[6], Barnett, L.[1], Lamb, K.[7]

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**Introduction.** In Saudi Arabia, a large percentage of children, particularly girls, are physically inactive. Inclusive strategies promoting physical activity for both genders are vital to address this issue. The TransformUs program, which successfully integrates movement into the curriculum in Australian primary schools, was adapted for the cultural context of Saudi Arabian primary schools. This study aimed to assess the feasibility of implementing the adapted TransformUs in Saudi Arabia. **Methods.** Before conducting a feasibility trial, a total of six teachers in two primary schools (one girls and one boys school in Saudi Arabia) attended a 1-hour training session about the importance of integrating physical activity and guidance on planning and delivering active breaks and recreation activities. Teachers were provided with resources such as examples of active breaks, how-to guides, and activity equipment. Over a four-week period, teachers implemented at least two activities per day, with support and follow-up from researchers. At the end of the trial, teachers participated in individual interviews, and students completed a survey about their school experiences and the program.

**Results.** Five teachers (2 females; 40-59 years old) and 104 children (23 girls; 8.8 ± 0.5 years, and 82 boys; 10.5 ± 1.7 years) completed the interview and the survey, respectively. All teachers recognised the importance of the program. Teachers from the girls' school reported positive outcomes, such as student enjoyment, an improved learning environment, and enhanced concentration and comprehension among students. All teachers felt the need to change current teaching practices and highlighted the positive effects on students' memory, concentration, comprehension, and behaviour. They expressed an intention to incorporate aspects of the TransformUs program in their future teaching. Among students, the majority reported participation in the active lessons and active breaks (69% and 50%), enjoyment of the lessons (60% and 84%), and a desire to continue (94% and 89%), respectively. **Conclusions.** The findings indicate that the adapted TransformUs program is feasible for implementation in Saudi Arabian schools. It has the potential to enhance student engagement, learning, and physical activity. Participatory approaches are recommended for future interventions in this context.
**Conflict of Interest.** No conflict of interest

**Examining the mediating effects of sleep on older adolescents' mental health: The Burn 2 Learn cluster randomised controlled trial**

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**Introduction.** Physical activity is known to benefit mental health, although the underlying mechanisms are less understood. This study explored the mediating effect of sleep on older adolescents' mental health in the context of a school-based physical activity intervention. **Methods.** The Burn 2 Learn (B2L) intervention was evaluated using a cluster randomised controlled trial, conducted in two cohorts. This was a sub study that involved participants from cohort 2. Participants (n = 292) were older adolescents (mean age = 16.0 [0.5]) from 10 secondary schools in New South Wales, Australia. Participants were randomised at the school level to the B2L intervention (n = 146) or a wait-list control (n = 146). Two teachers from intervention schools were recruited to deliver 2-3 high-intensity activity breaks (approximately 15 mins) per week to students during academic lessons. Participants completed measures of mental health (i.e., perceived stress, and internalising symptoms) and hypothesised mediators (i.e., sleep duration, sleep latency, awakenings, and daytime sleepiness) via questionnaires at baseline (February-April 2019) and post-intervention (August-September 2019). Separate single mediation analyses were conducted to explore the potential mediating effects of sleep variables on mental health outcomes using a product-of-coefficient test. **Results.** Overall, no mediated effects were found, but changes in several sleep-related variables were associated with changes in mental health. A small reduction was found for perceived stress ($\beta$ = -0.11, SE = 0.034, p = 0.002) in favour of the intervention group, but not for internalising symptoms ($\beta$ = 0.02, SE = 0.051, p = 0.760). There were no intervention effects for sleep duration, sleep latency, awakenings, or daytime sleepiness. **Conclusions.** The B2L intervention had a small beneficial effect on older adolescents' perceived stress, however, changes in sleep were not responsible for mediating these effects. Changes in markers of sleep were associated with changes in mental health, highlighting the importance of sleep for mental health. Despite the recognised links between regular physical activity in improved sleep parameters, short duration high-intensity activity may not be the most effective exercise modality for influencing older adolescents' sleep.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**The mediating effects of self-efficacy on adolescent mental health: Findings from the Burn to Learn cluster randomised controlled trial**

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**Purpose.** Engaging in physical activity is known to benefit multiple markers of mental health in adolescence. However, there remains a gap in knowledge on the mechanisms responsible for these effects. The aim of this study is to examine potential mediators of the effect of a school-based high-intensity interval training (HIIT) program on adolescents' mental health outcomes. **Methods.** The current study uses data collected from 375 school students (mean age = 16.02, SD = 0.38) who participated in the first year of the Burn to Learn cluster randomised controlled trial. Teachers in the intervention schools were trained to deliver at least two HIIT sessions per week during academic lessons across two 10-week school terms. A path analysis was conducted to assess the potentially mediating effect of HIIT self-efficacy, self-reported fitness, identified motivation, intrinsic motivation, and friend relatedness at 6 months post-intervention on mental health outcomes (externalising problems, internalising problems, and well-being) at 12 months post-intervention. **Results.** After adjusting

for baseline values, age, sex, BMI, and SES, the intervention did not have a significant effect on externalising problems: (estimate [SE] = 0.166 [0.101], 95%CI = 0 to 0.332, p = 0.099), internalising problems: (estimate [SE] = 0.043 [0.112], 95%CI = -0.142 to 0.227, p = 0.704). or well-being (estimate [SE] = -0.102 [0.132], 95%CI = -0.319 to 0.115, p = 0.439). However, there was a significant effect of the intervention on HIIT self-efficacy at 6-months (estimate [SE] = 0.427 [0.117], 95%CI = 0.234 to 0.620, p = 0.01), and a significant mediated effect of HIIT self-efficacy on externalising problems at 12-months (estimate [SE] = -0.209 [0.104], 95%CI = -0.380 to -0.038, p = 0.045). **Conclusions.** The findings suggest that improving adolescents' HIIT self-efficacy has a sustained positive influence on their externalising problems. Accordingly, targeting improvements in physical activity self-efficacy may be an effective strategy for reducing externalising problems in adolescents in future trials.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Effect of high-intensity interval training on hippocampal volume in older adolescents**

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**Introduction.** The mechanisms underpinning the benefits of physical activity for young people's cognitive and mental health are not established. While well-evidenced in adults, the effect of exercise on hippocampal volume in youth is unknown. This study examined the impact of a 6-month school-based high-intensity interval training intervention (Burn 2 Learn [B2L]) on hippocampal volume in adolescents using magnetic resonance imaging (MRI). We hypothesized that the B2L intervention would increase hippocampal volume. **Methods.** Participants were older adolescents [N=56, 61% female, 16.1±0.4 years] from four secondary schools (10 classes) in New South Wales, Australia, who were participating in a larger cluster randomised controlled trial. Participants were older adolescents [N=56, 61% female, 16.1±0.4 years] from four secondary schools (10 classes) in New South Wales, Australia, who were participating in a larger cluster randomised controlled trial. Participants were randomised to the B2L intervention (five classes, 30 participants) or a control group (five classes, 26 participants) and underwent MRI at baseline and 6-months. Participants wore an accelerometer, provided hair samples for quantification of cortisol concentration, and performed assessments of physical fitness and cognition at both timepoints. Changes in hippocampal volume were assessed using linear mixed models adjusted for sex, body composition, intracranial volume, and clustering at the class level, while correlations between change scores were assessed using Pearson's correlation tests. **Results.** We observed a group-by-time effect on total hippocampal volume (+1.05 mm3, 95% CI 0.25 to 1.86, d=0.79 in favour of the B2L intervention. This was mainly driven by a group-by-time effect in the left hippocampus (+0.65 mm3, 95% CI 0.14 to 1.16, d=0.76) (right hippocampus = +0.41 mm3, 95% CI -0.01 to 0.82, d=0.59). Increased total (r = -0.406, p=0.026) and left (r = -0.479, p=0.007) hippocampal volumes were associated with decreased hair cortisol concentration. Increased left hippocampal volume also correlated with increased time spent in weekday moderate-vigorous physical activity (r = 0.393, p=0.032). **Conclusions.** This is the first experimental study to show that physical activity can increase hippocampal volume in lower fit older adolescents and that these effects may be related to decreases in hair cortisol concentrations, a biomarker of chronic stress. Further studies involving larger samples are needed to replicate and build upon our findings.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Acceptability, dose, and fidelity of an activity break intervention for adolescents with disability: Burn 2 Learn adapted (B2La) cluster RCT**

Lubans, D.R.[1,2,3], Smith, J.J.[1,2], Leahy, A.A.[1,2], Eather, N.[1,2], Kennedy, S.G.[4], Boyer, J.[5], Vidal-Conti, J.[6], Shields, N.[7], Noetel, M.[8], Lonsdale, C.[9], Hillman, C.H.[10,11], Roche, L.[1], Reeves, P.[12], Oldmeadow, O.[13], Stimpson, L.[14], Comis, P.[14]

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**Introduction.** Physical activity declines dramatically during adolescence, with the lowest levels of activity observed among those with disability. Schools are ideal settings to address this challenge, but few school-based interventions have been designed for older adolescents with disability. The aim of our study was to assess teacher acceptability, dose delivered, and fidelity of an activity break intervention for older adolescents with disability. **Methods.** We are currently conducting a two-arm parallel group cluster randomised controlled trial in 28 secondary schools in New South Wales, Australia. In the first cohort, we randomised five schools to a wait-list control group, and another five schools to receive the Burn 2 Learn adapted (B2La) program. The research team provided teachers with training, resources, and support to facilitate program delivery. Schools allocated to the intervention group were asked to deliver two high-intensity activity breaks per week during scheduled specialist support classes for two school terms. Guided by self-determination theory, the B2La sessions involved foundational aerobic and muscle strengthening exercises tailored to meet students' diverse needs. Teachers completed a semi-structured questionnaire to determine their satisfaction with the training they received (acceptability). Teachers were asked to record the number sessions they delivered using a teacher logbook (dose delivered). The research team conducted two observations/school using a structured checklist to determine if sessions were delivered as intended (fidelity). **Results.** Teachers (n = 10) were highly satisfied with the training they received (mean = 4.7/5). Teachers delivered an average of 1.7 sessions/week over the intervention period. Mean fidelity score was 16.1/20 on the structured observation checklist. Although fidelity was generally high, teachers often failed to include strategies to support students' need for autonomy. **Conclusions.** The B2La program was well received by learning support teachers. Teachers delivered fewer sessions than what was prescribed. Based on our observations, the program was delivered with a high degree of fidelity.
**Conflict of Interest.** The authors have no relevant conflict of interest to declare.

## Reviews & More

### Promotion of muscle-strengthening physical activities in youth sport: A rapid review of evidence

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**Introduction.** Muscle-strengthening activities (MSAs) contribute to improvements in muscular fitness, bone and psychological health, and a reduced risk of cardiovascular disease and diabetes. However, few adolescents meet the guidelines (i.e., three days per week) for MSA (such as resistance training [RT]). Despite extensive evidence to the contrary, common misconceptions surrounding the safety, efficacy and necessity of RT for young people exist. Given the health behaviours developed in youth are those often carried through to adulthood, it is imperative youth are provided with guidance when it comes to the importance of MSAs. In Australia, youth sport a popular way for young people to be active and develop physical activity behaviours. In addition to the above benefits of MSA, it also plays an important role in improving sports performance and reducing the risk of sports-related injury. As such, the provision of evidence-based guidance regarding MSA participation in sport is necessary. The aim of this study was to review the MSA information provided by state (SSO) and national sporting organisations (NSO) for the top 10 Australian youth sports. **Methods.** A rapid review of evidence provided by SSOs and NSOs related to MSA guidelines was performed. Using AUSPLAY data, the top 10 sports for young people were included in the review. The website of each SSO and NSO for these sports were searched for recommendations provided, related to MSA (i.e., strength, weight, and/or resistance training). Educational, parent, and training resources for each page were systematically searched for any inclusion of information related to MSA participation for athletes. **Results.** Of the 10 NSOs, all provided information/resources on MSA for young athletes. Five SSOs provided information on MSA specific recommendations. Three NSOs and two SSOs provided age-specific recommendations aligned to the current evidence-base. **Conclusions.** The findings of this rapid review provide a starting point for the future update of MSA promotion materials by sporting organisations, to ensure the importance of, and application to sporting performance is clear for children and youth.
**Conflict of Interest.** Project funding was provided by Western Sydney University. The authors declare no relevant conflict of interest in relation to this work.

**The provision and experience of variety in physical activity settings: A systematic review of quantitative and qualitative studies**

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**Introduction.** Emerging evidence indicates that the provision or experience of variety may be an important determinant of physical activity behaviour. Variety refers to diverse endeavours, opportunities, or tasks and, in the context of physical activity, has been examined as a feature of an activity or environment (i.e., variety support) and an experience (i.e., ones felt experience or perceived variety). The primary aim of our review was to synthesize studies investigating the provision or experience of variety in physical activity settings on health and well-being, behaviours, and motivation. Our secondary aim was to examine quantitative data reporting on different facets of variety in physical activity settings. **Methods.** We conducted a systematic search of five electronic databases (Scopus, SPORTDiscus, Science Direct, MEDLINE, and the Human Kinetics Library) to identify studies providing a quantitative or qualitative assessment of variety in physical activity settings. **Results.** We identified 5,576 potentially relevant articles to examine. After title and abstract screening (and removal of duplicates), 74 articles remained for full-text screening, from which 28 studies were deemed eligible. Our findings from qualitative and quantitative (experimental and cross-sectional) studies demonstrate that the provision and experience of variety relates to participation and engagement in physical activity, motivation for exercise and physical activity, and well-being outcomes. Our results also indicate that the provision of variety can increase enjoyment, interest (i.e., motivation), and adherence to a physical activity program. **Conclusions.** Our findings support the assertion that variety should be considered during planning, implementation, and evaluation of physical activity programs. Additional experimental studies are needed to gain a better understanding of how elements of physical activity and exercise programs, delivery, and environment can be manipulated to increase variety and foster participation in physical activity.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**The role of context as a moderator in the physical activity and cognition relationship across the lifespan**

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**Introduction.** Although numerous reviews and meta-analyses have examined the effects of physical activity and cognition, the role of context as a potential moderator has not been comprehensively explored. This was the main focus of this study. **Methods.** Experimental studies were searched from five electronic databases until October 2022. Grey literature and studies conducted with typical population in English, German, Italian, and Greek were included. Core and high-order executive functions, academic achievement, and non-executive cognitive functions were the cognitive outcomes explored. Studies were coded based on the following characteristics of context: activity type (e.g., aerobic, game), domain (e.g., leisure, school), cognitive demand (e.g., low, moderate, high), physical (e.g., indoors, outdoors), and social environment (group, individual), delivery style (theory-based, evidence-based). Studies were categorised based on acute (i.e., single session) and chronic (i.e., multiple sessions) effects of physical activity on cognition. Pre and post-test mean values and standard deviations were extracted and converted to effect sizes. For the analysis, we conducted a structural equation modelling approach to multilevel model. **Results.** We meta-analysed 121 studies (583 effect sizes) with 46,158 participants from preschool to older adulthood (151 studies included in the review with 57,261 participants). Participation in both chronic (g = 0.15, [CI 0.10, 0.21]) and acute physical activity (g = 0.18, [CI = 0.08, 0.28]) on cognition had small positive effects on cognition. Largest effects emerged for physical activity outdoors (chronic: g = 0.39, [CI 0.20, 0.58]; acute: g = 0.26, [CI 0.03, 0.48]) and for group activity (chronic: g = 0.17, [CI 0.10, 0.23]; acute: g = 0.20, [CI 0.08, 0.33]). **Conclusions.** Different facets of the physical activity context such as the environment moderated the small effects of physical activity on cognition consistently for all age groups. Context may account for the effectiveness of physical activity interventions on cognition. Future research should incorporate and manipulate contextual factors in intervention studies to foster our understanding of the interplay of different moderators.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Are psychosocial work environments associated with health-enhancing physical activity and sedentary behaviour at work? A systematic review**

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**Introduction.** Behaviour at work may be influenced by multiple factors, including both the physical and psychosocial environment. The importance of targeting these multiple influences in workplace interventions has been highlighted by the World Health Organization. However, little is known about how psychosocial work environments, i.e., the culture of the organisation, manager support, job control, and work organisation can impact on sedentary behaviour and physical activity while at work. **Methods.** In September 2022, a systematic search was conducted across 7 databases and Google. Eligible studies included intervention and observational studies that reported on the relationship between the psychosocial work environment and physical activity or sedentary behaviour. **Results.** The review included 27 studies that evaluated activity at work: 17, 11, and 4 studies included an activity, sedentary behaviour, or standing outcome, respectively. One study evaluated breaks from sitting. There was a total of 70,252 participants across 20 cross-sectional studies, 1 longitudinal study, and 6 randomised trials (48 - 36,442 participants). Industries represented included office workers, nurses, military, manufacturing, and rural workers. Psychosocial work environment variables included manager support to sit less (2 studies), colleague support to increase activity/reduce sitting (5 studies), organisational support to increase activity/reduce sitting (7 studies), social norms around being active at work (4 studies), general social support at work (3 studies), co-worker proximity and visibility (2 studies), job control (14 studies), job strain (5 studies), effort-reward imbalance (2 studies), and job demands (10 studies). Beneficial associations were seen between manager support and reduced workhour sitting time (2 studies) and co-worker proximity and reduced workhour sitting or increased breaks (2 studies). Mixed findings, possibly dependent on industry and study design, were reported for the remaining associations. **Conclusions.** Managers and colleagues are likely to have a supportive effect on workhour activity levels. Further information across different psychosocial work environment factors and study designs is needed to explore how the workplace psychosocial environment influences both activity and sedentary behaviour in workers. This will be informative for future study designs, to aid understanding on how these factors may enable or interfere with activity at work.
**Conflict of Interest.** The authors declare no conflict of interest.

**Association between the built environment and obesity and the mediating role of physical activity: A systematic review**

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**Introduction.** Research establishes an association between the built environment (walkability, land-use mix, urban sprawl) and adult obesity. Physical activity is assumed to mediate this built environment-obesity relationship but the scope of evidence supporting this is unclear. This review synthesizes the evidence on the mediating role of physical activity and seeks to elucidate the preventive potential that the built environment may have for obesity prevention. **Methods.** Four databases (Scopus, Web of Science, MEDLINE and CINAHL) were searched to identify relevant articles. Inclusion criteria were unhealthy body size/obesity as outcome measure; built environment factors (objectively measured) as exposure; physical activity (self-reported/objectively measured) empirically assessed as a mediator; and an adult population aged 18 or older. Measures were heterogenous and meta-analysis was not possible. **Results.** 2581 records in total were screened for eligibility with 20 studies meeting inclusion criteria. Included studies were published between 2005-2022, primarily cross-sectional (86%) and conducted in the US (25%) and China (15%). Objectively measured moderate to vigorous physical activity (MVPA), consistently mediated the association between walkability (an index) and obesity measures (BMI, waist circumference, waist-to-height ratio), with greater MVPA accounting for up to 12% of the relationship (lower obesity in high walkable areas). Evidence of mediation was inconsistent for self-reported MVPA and for other exposure measures (population density, street connectivity, land-use mix, and greenspace). Three studies assessed specific physical activity domains; self-reported cycling for transport, walking and walking for transport, with significant mediation effects reported for the latter two explaining up to 30% and 19% of walkability-obesity relationships respectively. While cross-sectional studies supported physical activity's mediating role, longitudinal evidence (n=2) was limited and inconclusive. **Conclusions.** Physical activity partially explains the association between some but not all built environment factors and obesity. The current evidence consists of heterogeneous definitions and measures (built environment, physical activity, and obesity). It does not tell us which specific built environment attribute could be targeted to promote which specific physical activity behaviour for preventing population obesity. There is a lack of longitudinal evidence to support a causal interpretation of the built environment-obesity relationship through physical activity.
**Conflict of Interest.** The authors declare no relevant conflict of interest.

**Barriers and facilitators to physical activity participation among autistic adults: A scoping review**

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**Introduction.** Studies investigating the barriers and facilitators to PA participation among autistic adults are limited. A preliminary literature review has identified ten relevant studies with heterogeneous findings and mixed methods. This study was among the first attempts to summarise and synthesise the current empirical evidence and prevailing narratives to understand the influences on PA among autistic adults. **Methods.** A scoping review was conducted using the Arksey and O'Malley framework using five electronic databases, including MEDLINE, CINAHL, Scopus, SPORTDiscus and Proquest. Eligible studies required inputs on perceived barriers and facilitators of physical activity among autistic adults from autistic adults with no intellectual disabilities and/or their parents/caregivers using quantitative and/or qualitative methods. Eligible studies were critically appraised using the Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields. Extracted barriers and facilitators were categorised into the fourteen domains of the Theoretical Domains Framework (TDF), also linked to the six components of the Behavioural Change Wheel Framework to support analysis. **Results.** Ten studies were included (two mixed methods, four quantitative and four qualitative studies). Eight studies had quality assessment scores within the strong (over 0.8) categorisation, and two were in the good categorisation (0.7-0.8). The most common barriers include digital technology use, limited access to PA facilities and opportunities (Environmental Context and Resources domain), and a lack of interest or motivation in PA (Intentions domain). The most common facilitators include having external support from family, peers, and trainers; having parental support and a positive attitude toward PA (Social Influences domain); and having positive perceived competency (Belief about Capabilities domain). **Conclusions.** Most recognised factors influence health behaviours in numerous models and theories of physical activity engagement. However, the domain of social influences seems to influence PA participation among autistic adults significantly, a factor typically neglected by previous interventions. Future interventions should explore specific strategies to address the barriers and enhance facilitators to improve PA participation in this population.
**Conflict of Interest.** The authors declare no relevant conflict of interest about this work.

**Perceived barriers and facilitators to performing regular activity breaks at home in the evening**

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**Introduction.** People accrue the longest period of uninterrupted sitting in the evening. Laboratory research has found that regularly interrupting evening sedentary time with short bouts of activity improves postprandial metabolism and free-living sleep duration. Commonly cited barriers to reducing daily sitting time in occupational settings are both environmental and personal, for example not wanting to disrupt workplace social 'norms', and a general lack of motivation. As most research has been conducted in occupational settings, it is essential to understand the barriers and facilitators to performing regular activity breaks as a means of reducing sitting time, particularly in the evening period. **Methods.** 28 participants (female n=20, age 25.4 Â± 5.5 years) individually participated in a face-to-face semi-structured interview after participating in a laboratory-based study examining the effects of performing regular activity breaks in the evening. Participants discussed their experience of performing regular activity breaks and what would support or hinder them performing them at home. Data were analysed using inductive thematic analysis. **Results.** Participants felt the activity breaks were easy and achievable to perform but could become repetitive. Perceived barriers to performing activity breaks in the evening at home were: 1) not wanting to interrupt their television viewing or gaming; 2) forgetting to do them; 3) a lack of motivation; and 4) environmental factors such interrupting others. Participants explained that performing regular activity breaks at home would be made easier if there were: 1) electronic reminders or cues to do them; 2) someone to do the activity breaks with; 3) being motivated through knowing and experiencing the benefits and setting goals; and 4) having access to activity breaks videos as a resource. **Conclusions.** Performing activity breaks at home in the evening would be achievable. Future free-living interventions that involve performing regular activity breaks in the evening should consider increasing the variety of 'activity breaks' and utilizing prompts/cues with visual exercise guides.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Footy-FIT protocol: Promoting physical activity and healthy lifestyles in female sports fans**

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**Introduction.** The FIT program has been shown to be effective at increasing physical activity in men across a number of sports, including Australian based sports, with programs now being delivered to women (UK soccer). However, this program has yet to be delivered to women in Australia. Footy-FIT will, for the first time in Australia, provides a physical activity program for women using three sporting codes of League, Union and Soccer, delivered by female coaches. **Methods.** Female supporters from three local Brisbane sports clubs will be recruited. Inclusion criteria will be women aged 18+ years old, and insufficiently active. This program will have two unique phases. Phase 1: A working group consisting of the research team, club stakeholders, and club coaches, who will meet to discuss the FIT model and whether any aspects of the program, resources and infrastructure require redevelopment to optimise the delivery of the program for women. Phase 2 - Program: Participants will receive 12-weekly, 90-minute sessions, delivered at the clubs. Sessions will comprise of 1) a coach led 45-minute physical activity session tailored to the fitness levels of participants. 2) education about behavioural risks and healthy lifestyles (physical activity, sedentary behaviour, healthy eating). Content will be presented simply, with the delivery aimed to be participative and peer supportive of discussed topics. A coach connected to the club will deliver both education and physical activity components. Linear Mixed Models will assess changes in outcome measures collected pre and post intervention (objective physical activity, weight, waist circumference, BMI, blood pressure, and well-being). P-values will be based on two-sided tests and considered statistically significant at $p<.05$. **Results / Conclusions.** Footy-FIT is unique because despite robust evidence for the acceptance and effectiveness of these programs in men for the sport of soccer, AFL and rugby, evidence for the FIT program in the Australian context has yet to be examined for women. Further, the unique delivery across a number of Footy sporting codes, rugby league, rugby union and soccer, has not been examined before.
**Conflict of Interest.** Authors declare no relevant conflict of interest in relation to this work.

## School & Community Health

### Stepping up together: The role of community health workers in promoting physical activity in Aotearoa

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**Introduction.** Just over half of New Zealand adults meet the physical activity guidelines, and 12.5% are active for less than 30 minutes per week. Additionally, the prevalence of non-communicable diseases is on the rise, accompanied by a noticeable increase in more sedentary recreational activities. Therefore, prevention strategies that include lifestyle behaviour counselling have become increasingly important. Community health workers (CHWs) bridge the gap between community and healthcare workers. In Aotearoa, they develop and implement strategies to improve the health of individuals and their whānau. CHWs may have the capacity to play a more prominent role in prescribing and promoting physical activity in a public health setting. **Methods.** A theoretical model for task shifting is proposed, whereby CHWs take on five main tasks, (1) physical activity assessment; (2) Conducting basic screening and risk assessment; (3) Physical education counselling and education; (4) Culturally responsive exercise prescription for communities and whānau and (5) onward referral for high-risk patients. **Results.** Previous research has demonstrated that health care systems can be redesigned to include CHWs as integral members of the clinical team in order to improve patient outcomes. However, successful task shifting requires careful organization structuring that includes roles that are clearly defined, training that is adequate and ongoing, evaluation of delivery quality and supervision. **Conclusions.** CHWs may present a unique and important opportunity to safely improve physical activity levels and aid in behavioural change that is culturally responsive and inclusive.

### What should all health professionals know about movement behaviour change? An international Delphi-based consensus statement

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**Introduction.** The World Health Organisation has called for action to integrate physical activity promotion into healthcare settings. There is a lack of consensus on the competencies required by health professionals to deliver effective movement behaviour change support. The objective of this study was to establish key competencies relevant for all health professionals to support individuals to change their movement behaviours. **Methods.** Consensus was obtained using a three-phase Delphi study. Participants with expertise in physical activity and sedentary behaviour were asked to report what knowledge, skills, and attributes they believed health professionals should possess in relation to movement behaviour change. Proposed competencies were developed and rated for importance. Participants were asked to indicate agreement for inclusion, with consensus defined as group level agreement of at least 80%. **Results.** Participants from 11 countries, working in academic (55%), clinical (30%), or combined academic/clinical (13%) roles reached consensus across three rounds (n=40, n=36, n=34, respectively) on 11 competencies. Some competencies considered as specific to certain disciplines did not qualify for inclusion. Participants agreed that health professionals should recognise, take ownership of, and practice inter-professional collaboration in supporting movement behaviour change; support positive culture around these behaviours; communicate using person-centred approaches that consider determinants, barriers, and facilitators of movement behaviours; explain the health impacts of these behaviours; and recognise how their own behaviour influences movement behaviour change support. **Conclusions.** Consensus on 11 competencies was achieved. These may serve as a catalyst for building a culture of advocacy for movement behaviour change across health disciplines.
**Conflict of Interest.** The authors have no conflict of interests to declare.

**Developing a physical activity 'vital sign' for hospital settings**

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**Introduction.** In acute and sub-acute hospitals, low physical activity levels are an indicator of poor health and, in older adults, strongly associated with deteriorating function and hospital-acquired complications. However, owing to the lack of an appropriate, validated physical activity measure, physical activity is not currently measured by hospitals, nor documented. The aim of this study was to determine the perspectives of hospitalised patients and their carers and hospital staff about what matters and what is feasible with respect to measuring physical activity in hospitals, in order to design a physical activity vital sign for hospital settings. **Methods.** We used purposive sampling to recruit multidisciplinary clinicians to participate in in-person and online focus groups, and patients and carers (e.g. family) to participate in in-person and telephone interviews within local and international health services. A semi-structured interview guide was used to collect data on attitudes towards measuring physical activity in hospital settings. Conventional content analysis was used to analyse focus group and interview transcripts to extract data on preferred content, design and implementation of the vital sign. **Results.** Content identified from focus groups and interviews included that: physical activity is not measured in hospitals, but clinicians and patients believe it should be; nurses believe they play a key role in collecting/reporting physical activity data and that, if quick to administer, this could be integrated into their routine monitoring tasks; an indicator of patients level of independence should be included in the vital sign; and physiotherapists and occupational therapists want to use the vital sign as a goal setting tool. **Conclusions.** Hospital based clinicians and patients/carers provided valuable information regarding the content, design and implementation of the vital sign. This information will be used to develop a prototype of the vital sign tool which will then undergo further user testing and clinical and technical validation. The new measure will contribute significant value to understanding patient activity levels in real-world hospital settings, thereby highlighting physical activity as a critical component of care, in order to drive behaviour change, avoid hospital-acquired function decline (particularly in older adults) and improve short- and long-term hospitalisation outcomes.

**Tapuwaekura: An indigenous approach to promoting wellbeing through activity in the natural environment**

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**Purpose.** Tapuwaekura is a developmental approach to enhancing the inter-relationship between activity in the natural environment, Mātauranga Māori and wellbeing of young people and whānau in kura kaupapa Māori Tapuwaekura is led by Sport NZ Ihi Aotearoa, in partnership with Ngā Pākura and supported by the Ministry of Education and Ministry of Health. It is a customised delivery model specifically established to support a Māori worldview of wellbeing and is aligned

to Ka Hikitia New Zealand Māori Education Strategy. **Project Description.** Underpinned by the Atua Matua Framework, Tapuwaekura supports kura and kaiako to implement a Te Ao Māori approach through whakapapa and mātauranga Māori to connect young people to te taiao (the environment) for better wellbeing outcomes. Atua Matua is an indigenous approach to wellbeing, reconnecting young people to mātauranga taiao (Māori environmental knowledge). Atua represent environmental knowledge and Matua represent iwi-centred interpretations of environmental knowledge. The Atua Matua Framework uses this traditional knowledge and the different environments of Aotearoa New Zealand to encourage lifestyle changes through physical activity and healthy eating. Tapuwaekura has supported 34 kura and 192 kaiako across seven regions to adopt and integrate an Atua Matua approach in strategy, planning and teaching practice. This is contributing to two inter-related change processes; a) supporting kura to embed Atua Matua as an approach, b) supporting kura to Indigenise their systems, policies and curriculum. **Conclusions.** The Atua Matua Framework within Tapuwaekura is benefitting young people culturally, physically and educationally, through cultural knowledge and connections, retaining mātauranga (Māori indigenous knowledge) that is relevant to their context (whakapapa), and being more active and engaging their whānau. This has relevance to broader initiatives that aim to promote physical activity as well as human and environmental wellbeing in Aotearoa New Zealand as well as other Indigenous populations globally.
**Conflict of Interest.** RT, ZT, CC, WM, NS are employees of Sport NZ and are actively engaged in researching and promoting physical activity policy and practice in New Zealand. Te Paetawhiti Ltd are contracted by Sport NZ to evaluate the delivery and impact of Tapuwaekura.

### Revolutionising vocational education through movement

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**Purpose.** To utilise physical activity (PA) as a multidimensional instructional tool to improve learning outcomes for students undertaking the new Victorian Certificate of Education (VCE) Vocational Major (VM), where experiential and real-world learning is valued. **Project Description.** The positive health outcomes associated with PA are widely accepted. The emergence of positive educational outcomes has positioned PA as a multidimensional and flexible instructional tool. Here, PA can be used in isolation through the implementation of Active Breaks or can be used to create deep experiential learning moments where students embody the learning through active learning experiences. Through hands on experiential learning; student engagement, focus and concentration are enhanced. Furthermore, self-esteem, connection and learner confidence are improved. As the Victorian Certificate of Applied Learning (VCAL) moves towards the VCE VM model, we must reflect upon the celebrated principles of VCAL experiential and real-world and not regress to the more passive sedentary teaching style that dominates VCE. We must capitalize on the opportunity to use PA as an instructional tool and deliver the new curriculum in a way that honours and recognises the benefits of experiential learning. Within the VCE VM, PA can become the vehicle for ensuring the curriculum, learning and needs of students are met. In partnership with IVET, TransformUs has developed a multipronged product that reflects active learning principles and pedagogies, honours the guiding principles of VCAL, whilst fulfilling the requirements of the new VCE VM. The package includes 1) a teacher handbook which includes 50 lesson plans and assessment tasks per unit, designed using TransformUs active strategies, utilises the High Impact Teaching Strategies and follows the GANAG instructional model; 2) A student workbook containing the key knowledge, supporting resources and learning tasks; and 3) a teacher resource book containing all resources needed to deliver the curriculum. **Conclusions.** The VCE VM package, created by TransformUs in partnership with IVET, will service over 5,000 Victorian secondary school students, and demonstrates how PA can be used as a tool to improve teaching and benefit the learning outcomes of students.
**Conflict of Interest.** The author declares no relevant conflict of interest in relation to this work.

### Training a culturally capable future physical activity promotion workforce: Developing postgraduate qualifications in physical activity and hauora/wellbeing (PAH)

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**Purpose.** The goal of the new Postgraduate Certificate, Diploma, and Master of PAH is to provide a specialist qualification at an advanced level and/or advance the career of existing physical activity promotion sector members. These qualifications uniquely respond to additional demand for staff with advanced skills in equitable physical activity promotion. **Project Description.** The qualifications are designed to develop advanced knowledge and skills in physical activity promotion and physical activity-related mātauranga Māori. It prepares students to fill a gap in the public health and physical activity promotion workforce. While physical activity is an important part of effective health promotion, most organisations within the sector rely on a patchwork of other health professionals who, at present have limited tertiary training in physical activity and health promotion adapted to the Aotearoa New Zealand (NZ) context. Māori experts have

contributed to developing specialised content and delivery methods which applying mātauranga Māori alongside established international theory and health promotion. This inherently embraces a more holistic approach to physical activity (wider than sport or structured exercise) and its interaction with hauora at both policy and community levels. It also provides a strengths-based platform for increasing the engagement and success of Māori and Pacific students within the Faculty of Health, and more broadly. The teaching and learning objectives are aligned with the Ngā Kaiakatanga Hauora (Health Promotion) competencies. Students will meet the accreditation standards of the Health Promotion Forum of NZ once formalised. Graduates will be prepared for advanced level jobs across the physical activity, health and wellbeing sectors. These qualifications have been informed by direct engagement with global experts in physical activity promotion at other tertiary institutions globally, and will be launched in 2024. **Conclusions.** These qualifications are part of a broader suite of capacity building activities designed to development of a fit-for-purpose physical activity promotion workforce of practitioners, policymakers, and researchers across diverse settings and sectors in NZ and internationally.

**Beyond 'brain breaks': a new model for integrated classroom-based active breaks**

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**Purpose.** Regular physical activity provides physical, mental, and cognitive benefits for children. However, globally, only 20% of children meet recommended levels of physical activity and, on average, students sit for three-quarters of the school day. Active breaks are a well-tested component of many school-based physical activity interventions. Although proven to be effective in the short term, there are a multitude of barriers to the sustainable implementation of active breaks by teachers in schools. To overcome these barriers, we need to re-conceptualize the narrow, traditional idea of the brain break, where active breaks are seen as being separate or isolated from learning and teaching, where the physical activity is perceived as interrupting learning, and where students stand to be active and sit to learn. **Project Description.** This paper presents the TransformUs Active Break (TAB) model, which positions active breaks within an overall approach to proactive classroom management and as a key contributor to effective teaching. The TAB model comprises five types of active breaks, each serving a specific educative function structure, transition, manage, energize, and learn. **Conclusions.** The model demonstrates how the active breaks can be integrated meaningfully into lessons to enhance teaching and learning, and consequently serve as an effective approach for sustained school-based physical activity.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**The Heart Foundation's Energize programme: Enhancing health environments in Te Whanganui-a-Tara primary schools**

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**Purpose.** This abstract provides an overview of the Heart Foundation's Energize programme, aimed at improving health environments in schools with high Māori and Pacific enrolment or a higher Equity Index number. **Project Description.** The programme was initially developed by Sports Waikato. Under the stewardship of the New Zealand Heart Foundation, the programme expanded to Wellington. In Te Whanganui-a-Tara, the programme has been operational since 2016, initially following the exact specifications outlined by Waikato. Over time the Wellington programme was tailored to meet the needs of the local community and has continued following the cessation of the Energize programme in Waikato. An important aspect contributing to the programme's success in Te Whanganui-a-Tara is the incorporation of Māori cultural elements and protocols. This includes engaging with Te Ao Māori games, which have yielded outstanding outcomes. Several schools that previously did not participate in Ki o Rahi, a traditional Māori game, have now made it a regular activity. The programme's approach in Te Whanganui-a-Tara focuses on meeting schools where they are and providing tailored support aligned with their unique kaupapa. This approach has successfully supported Kura Kaupapa and Full Immersion units. Additionally, the programme emphasises the importance of building relationships with schools and the community. This is achieved through sessions on Te Whare Tapa Wha, community and whānau events, and school karakia. Evaluation of the Energize Programme's effectiveness includes narrative reports documenting observed changes in schools. These reports highlight various positive outcomes, such as teachers gaining confidence in organizing activities like Ki o Rahi and schools feeling prepared to engage in interschool competitions. Moreover, students who previously had limited involvement in physical activity now feel empowered to participate. Feedback from schools regarding observed changes resulting from the programme is also collected. **Conclusions.** By adapting to local needs, incorporating Māori cultural elements and Te Ao Māori games, and fostering relationships within the school community, the programme has successfully engaged schools, teachers, and students in physical activity. These efforts contribute to fostering healthier and more active school communities.

# Clinical Populations & Outcomes I

### Interventions using wearable activity trackers to improve physical activity and other outcomes in hospitalised adults: A systematic review and meta-analysis

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**Introduction.** Physical inactivity during a hospitalisation is thought to contribute to a range of poor outcomes for patients. Using wearable activity trackers during hospitalisation may help to improve patient activity and other outcomes. This systematic review and meta-analysis aimed to evaluate the effect of interventions that use wearable activity trackers during a hospitalisation on patient physical activity, sedentary behaviour, clinical outcomes, and hospital efficiency outcomes. **Methods.** Seven electronic databases were searched from inception to March 2022. Clinical trial registries were also searched for registered protocols. Randomised and non-randomised clinical trials of interventions that used wearable activity trackers in adults (aged >18 years) experiencing a hospitalisation were included. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guidelines were followed. Study selection, data extraction and critical appraisal was conducted in duplicate. Data were pooled for meta-analysis using random-effects models. Primary outcomes were objectively measured physical activity or sedentary behaviour. Secondary outcomes included clinical outcomes (e.g. physical function, pain), and hospital efficiency outcomes (e.g. length of stay, readmission). **Results.** Fifteen studies with a total of 1911 participants were included, representing various surgical cohorts (n=4 studies), stroke rehabilitation (n=3 studies), orthopaedic rehabilitation (n=3 studies), mixed rehabilitation (n=3 studies), and mixed medical (n=2 studies). All studies were included in meta-analyses. Compared with usual care, wearable activity tracker interventions significantly increased overall physical activity (standardised mean difference=0.35, 95% CI [0.15, 0.54], p=0.0005, I2=72%) and physical function (standardised mean difference=0.27, 95% CI [0.081, 0.46], p=0.006, I2=0), and reduced sedentary behaviour (mean difference=-35.46 min/day, 95% CI [-57.43, -13.48], p=0.002, I2=0). There was no significant effect of wearable activity tracker interventions for pain, mental health, length of stay, or readmission risk. **Conclusions.** Interventions that used wearable activity trackers with hospitalised patients were effective for increasing patient physical activity levels, reducing sedentary behaviour, and improving physical functioning compared to usual care. The impact of wearable activity tracker interventions on other clinical and hospital efficiency outcomes remains unclear due to limited available data, highlighting the need for further investigation in these domains.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Lifestyle management of youth impacted by type 2 diabetes: A systematic review

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**Introduction.** There were an estimated 41,600 new cases of type 2 diabetes (T2D) in youth in 2021. Youth onset of T2D is associated with poorer quality of life, and an estimated reduction in life expectancy of 15 years, attributable to severe long-term microvascular and macrovascular complications and comorbidities. T2D is considered a 'lifestyle disease'; however, there is a lack of consensus on the efficacy of lifestyle management for youth with T2D. The purpose of this systematic review was to (1) examine the relationships between lifestyle factors and T2D-indicators, and (2) examine the efficacy of lifestyle management on T2D-indicators, in youth impacted by T2D. **Methods.** Studies were identified from PubMed, Embase, CINAHL, APA PyscInfo, Scopus, Cochrane, and Web of Science. All empirical studies that examined lifestyle factors or interventions [i.e., physical activity (PA), sleep, diet, wholistic lifestyle intervention] on T2D-indicators (e.g., glycaemic control, body composition, cholesterol, triglycerides) in youth aged 18yrs with diagnosed T2D were included. Screening and data extraction was performed in duplicate for accuracy. Quality appraisal was conducted by two reviewers according to the National Collaborating Centre for Methods and Tools Assessment Tool for Quantitative Studies. A narrative synthesis was conducted following the Cochrane's synthesis without meta-analysis guidelines. **Results.** 1870 studies were identified, of which 21 were included. Synthesis of the 10 identified observational studies indicated that certain PA, diet, and sleep behaviours (e.g., vigorous PA 3 times per week, fibre intake, saturated fat intake, sleep score) were consistently associated with glycaemic control. 11 intervention studies were identified, reporting on findings from seven trials. Synthesis revealed considerable heterogeneity, and mostly no or insignificant changes to T2D-indicators. Quality of all studies was 'weak'. **Conclusions.** Associations between lifestyle factors and T2D-indictors (e.g., glycaemic control) were evident; however, the effectiveness of lifestyle interventions on T2D-indicators was inconclusive. The findings underscore the complexity of addressing T2D in youth and highlight the need for further research to better understand the mechanisms and effectiveness of lifestyle management on youth with T2D. Such

research is critical for improving quality of life, disease burden, and life expectancy of youth with T2D.
**Conflict of Interest.** The authors declare no relevant conflict of interest.

### A scoping review of 5As counselling to promote physical activity to people with non-communicable diseases

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**Introduction.** Regular physical activity offers numerous benefits for individuals with non-communicable diseases (NCDs); however, participation is typically low. Counselling may be a useful means to promote physical activity, and the World Health Organisation endorses the 5A framework. This scoping review aimed to provide an overview of interventions using the 5A counselling framework to promote physical activity to people with NCDs. **Methods.** Web of Science, CINAHL, Scopus, PubMed and PsycINFO databases were searched for intervention studies published between January 2000 and December 2022. NCDs included cardiovascular disease, cancer, diabetes, musculoskeletal disorders, respiratory diseases, and mental illness. Data were extracted on NCD participants, implementation of 5A physical activity counselling, interventionists, and physical activity assessment and outcomes. **Results.** A total of 8, 833 references were imported into Covidence™ for screening, and 11 studies were included in the final review. Cardiometabolic conditions (72%) were the most common NCDs studied. 5A counselling was typically provided within multi component interventions and using individual sessions with duration ranging from 5-45 minutes, and a total of 3-15 sessions. Most counselling was delivered by medical professionals (72%). Interventionist training in the 5A counselling framework ranged from 15 minutes to one day, although in most studies training and support was unspecified. Fidelity assessments were described in four studies. Only one study provided a detailed description of 5A counselling session content. All studies assessed physical activity using self-reported duration, and seven (62%) used activity monitors. Eight studies (72%) reported significant improvements in physical activity from baseline to post intervention (6 months). Only three provided maintenance data (6 months), with mixed results. **Conclusions.** Counselling using the 5A framework can promote physical activity among people with NCDs. Better reporting is needed regarding counselling content. More research is needed with interventionists from counselling-based disciplines, and with less studied NCDs such as mental illness, chronic obstructive pulmonary disease, cancer, and musculoskeletal conditions.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Insights into activities of daily living in heart failure patients: A wearable camera image analysis

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**Introduction.** Globally, heart failure (HF) affects more than 64 million people and attempts to reduce its social and economic burden is a public health priority. Interventions to support people with HF to self-manage have been shown to reduce hospitalisations, improve quality of life, and reduce mortality rates. Understanding how people self-manage is imperative to improve future interventions; however, most approaches to date, have used self-report methods to achieve this. Wearable cameras provide a unique tool to understand the lived experiences of people with HF and the daily activities they undertake, which could lead to more effective interventions. However, their potential for understanding chronic conditions such as HF is unclear. The aim of this study was to determine the potential utility of wearable cameras to better understand activities of daily living in people living with HF. **Methods.** This study analysed wearable camera image data obtained from people living with HF. Images were processed using the E-Myscéal system with customized search terms for seven activities of daily living (physical activity, gardening, shopping, screen time, drinking, eating, and taking medication). The utility of the system for capturing specific activities was evaluated using sensitivity analysis. Daily activity image data were analysed using descriptive statistics. Differences in recorded activities were also captured for 10 participants that were readmitted to hospital for HF. **Results.** The E-Myscéal system demonstrated heightened sensitivity towards specific search terms. Overall, a higher number of images were recorded for eating and drinking, while the number of images for physical activity, screen time and taking medication was lower. More activities were recorded before midday compared with afternoons. Changes in the participants' daily activities were also observed before and after their hospitalization. **Conclusions.** Wearable cameras can capture valuable data on daily activities of people living with HF to develop personalized interventions. A flexible interrogation system is crucial for efficient analysis of the huge volume of data produced by lifelogging devices.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Impact of ongoing COVID-19 symptoms on physical activity participation in people with type 2 diabetes**

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**Introduction.** While people with type 2 diabetes (T2D) are no more likely to be infected with COVID-19 than the general population, they are twice as likely to develop critical COVID-19 illness if infected. This places them at greater risk of having ongoing symptoms, the presence of which will not only impact their ability to complete their activities of daily living, but also their ability and willingness to participate in exercise, which is important for T2D management. Therefore, the aim of this research was to understand the impact of ongoing COVID-19 symptoms on physical activity participation and T2D management in people with T2D. **Methods.** This study was an online survey (REDCap) of adults with T2D who had confirmed COVID-19 >12 weeks ago, in Australia. **Results.** 1,138 people with T2D responded (age 58.2 ± 15.2 years, 44% female, 55% male, 1% non-binary/transgender, T2D duration 12.2 ± 8.8 years, time since COVID-19 infection 36.9 ± 21.2 weeks), across all Australian states and territories. One third of respondents reported ongoing symptoms, with cardiorespiratory (63%), fatigue (62%), and neurological (43%) symptoms being most prevalent; 34% of respondents reported a worsening of their T2D management since their COVID-19 infection, with 28% reported trouble controlling their blood glucose. Two thirds of respondents with ongoing symptoms reported that these symptoms moderately to severely impact their ability to perform activities of daily living, work, and/or exercise, with 13% unable to do one or more of these. 65% reported reducing the frequency, duration, and/or intensity of exercise since their COVID-19 infection (median weekly exercise duration 65 mins [IQR 20, 180]), with 35% not yet returning to their pre-infection exercise levels; 50% cite ongoing symptoms as the primary reason for this. **Conclusions.** Physical activity is a crucial component of T2D management. However, the high prevalence of ongoing COVID-19 symptoms is hindering participation in this population, as well as deleteriously impacting T2D management. Developing strategies to support people with T2D and ongoing COVID-19 symptoms to recommence safe levels of physical activity is of critical importance.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Utilising step count to compare physical activity between surgical and non-surgical patients with hip-related pain and healthy controls**

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**Introduction.** Hip-related pain can have far-reaching consequences for individuals, particularly in relation to physical activity and optimising the role of activity in management. Physical activity is an important outcome for this cohort, but poorly reported in the current literature, with objective measures rarely included. The primary purpose of this study was to utilise commercial accelerometers to compare mean daily step count, as a proxy measure for physical activity, between four groups sited at different points on the spectrum of hip disease, from healthy controls to post-arthroscopy, using the iHOT-33 to explore hip-related quality-of-life. We hypothesised that adults with hip-related pain would have a lower mean daily step count than healthy controls and that commercial devices would provide adequate return of data. **Methods.** A cross-sectional analysis of step count data was undertaken for 116 participants (aged 18 to 50) comparing healthy controls (n=36) and three groups with hip-related pain: football players (n=17); individuals undertaking physiotherapist-led treatment for femoroacetabular impingement syndrome (FAIS) (n=39) and post hip-arthroscopy patients (n=24). Multivariate regression analysis was used, accounting for age and sex, to determine between-group differences. Step count was used to categorise activity level. iHOT-33 scores were assessed across symptomatic groups. **Results.** Mean daily step count did not differ between the four groups after adjusting for age and sex (p=0.558) [controls 9,590±3,256; footballer players 10,053±2,769; FAIS 10,393±3,848; Hip-arthroscopy 9,568±2,850]. Across all groups 42% of participants were classed as highly active/active, 34% as somewhat active and 25% as low active/sedentary. iHot-33 scores (sport/recreation subscale) for symptomatic groups were 56±18; 40±21 & 48 ±28 [Football, FAIS and Hip-arthroscopy groups respectively]. Successful retrieval of 95% of step count data from commercial accelerometers was

achieved. **Conclusions.** Findings indicate that weight-bearing physical activity, operationalised as step count, is consistent across groups. Deficits were identified in hip-related quality-of-life measures across symptomatic groups compared to previously established normative values for healthy individuals. The observed pattern strengthens the premise that physical activity outcomes should encompass a range of measures to provide different perspectives of this complex construct. Acceptable retrieval of step count data was achieved using commercial accelerometers within this cohort.
**Conflict of Interest.** Authors declare no relevant conflict of interest in relation to this work.

**Can an Australian football theme engage men with cardiovascular disease in a physical activity and dietary behaviour change program? Findings from a feasibility randomized trial**

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**Introduction.** Physical activity and weight management are critical for cardiovascular disease (CVD) secondary prevention. However, physical activity adherence during or after cardiac rehabilitation is low. The feasibility, appeal and effectiveness of 'Fans in Training' style programmes for men 'at risk' of CVD because of their weight have been documented. However, to date, these programmes have focused on weight management. This style of intervention has not been explored as a means to improve physical activity and dietary behaviours for secondary CVD prevention. Here, we assess the feasibility and acceptability of the Australian football-themed Aussie-FIT programme and associated trial procedures when adapted for men with CVD. **Methods.** We conducted a pragmatic randomised control trial (RCT), with waitlist control arm, and follow-up measures at 3 and 6 months. Men with a CVD diagnosis and body mass index (BMI) >25kg/m2 were recruited and randomised, following baseline measures of health and health behaviours. The target sample size (total n=72) was pragmatic, reflecting the feasibility aims. The intervention arm attended 12 face-to-face football-themed education and physical activity sessions. Feasibility (recruitment, retention, attendance, and adherence to trial procedures) were assessed via mixed methods. Acceptability was assessed via questionnaires. **Results.** 74% (64/86) of men expressing interest met the eligibility criteria. Of those, 49 men (mean age=61.4, SD=9.5, mean BMI=31.3, SD=4.2) were randomised. Programme attendance rates (87% attended >80% of sessions) and retention (92%) were high. Trial retention at the primary endpoint (3-months) was high (86%), and at the 6-month follow-ups reduced to 67%. Programme and trial procedures were acceptable, except for the request to visit a pathologist for the blood draw. **Conclusions.** Using a football theme and setting may be an acceptable and feasible way to engage men with CVD in physical activity and dietary behaviour change. Given the existing pilot evidence for men at risk of CVD, and that recruitment rates were under the target, trialling a programme for men with or at risk of CVD is recommended.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Promoting physical activity as part of a multidisciplinary, blended delivery wellbeing and healthy lifestyle program for people with rheumatoid arthritis**

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**Introduction.** Recommended self-management of rheumatoid arthritis (RA) includes physical activity, healthy eating and stress management. This study assessed the impact, feasibility, acceptability and safety of an innovative multidisciplinary, blended delivery healthy lifestyle and wellbeing program for adults with RA. **Methods.** This was a single-group pilot study with six people recruited from hospital outpatients. The program was delivered by a multidisciplinary team over 16 weeks and included in-person group resilience training (6x 2 hours/week), in-person group supervised exercise training (8x 1 hour/week), video/telephone individual nutrition counselling (5x 30 minutes/fortnight) and in-person group behaviour change counselling (4x 1 hour/fortnight). The exercise component included individualised

assessment of goals and preferences (75minutes), resources (activity monitor, therabands, swiss ball), a gym orientation and personalised programming. Impact measures included self-reported physical activity and sitting time, and objective indicators of physical functioning (6-minute Walk Test, Grip Strength, Timed Up and Go, 30 seconds Sit to Stand) and anthropometry (height, body mass). Diet composition and wellbeing were assessed by self-report questionnaire. Impact was analysed using paired t-test, Wilcoxon signed-rank and McNemar's tests. Feasibility was assessed using participant attendance and interventionists written reflections. Acceptability was assessed by participant questionnaires. Safety was assessed using study-related adverse events. **Results.** There were significant ($p<.05$) improvements from baseline to week 17 in sitting time, exercise capacity (6-minute Walk Test), neuromuscular strength (Grip Strength, Sit to Stand), and diet composition. There were improvement trends for physical activity, body mass index, and wellbeing. Average attendance was 77% for exercise training and 77-86% for other program components. Data from the exercise interventionist highlighted the value of the group format and supervised exercise intensity, and a need for more individualised support and tailoring as participants' exercise abilities and confidence improved. Participant feedback was very positive for the exercise component. There were no adverse events. **Conclusions.** This program had positive impact, good feasibility and high acceptability and safety. Recommendations for future implementation include online drop-in sessions for individualised exercise support. A larger randomised controlled trial is justified to determine efficacy.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

# Leaders in the Field

### Explaining the marked increase in global physical activity publications 1985 to 2022

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**Introduction.** There has been a marked recent increase in the number of physical activity publications. To explore the drivers of the increase is important to researchers and policymakers. **Methods.** Existing databases were examined for physical activity publication trends, with the primary analysis in Scopus with "physical activity" as a title word or keyword. Publication trends were examined 1985 and 2022. Results were corroborated in Medline and Wed-of-Science. Segmented regression analyses explored if any periods of time showed increases in the numbers of physical activity publications, using Joinpoint software (NCI). **Results.** Overall, 214,626 papers were published 1985-2022, with number significantly increasing after 2000, and again from 2017 (Figure). The slopes of the second and third periods were significantly different to each other and to the baseline period. The proportion that were reviews (systematic or otherwise) of the total PA papers was 10.5% in period 1, increasing slightly to 13.4% and 12.2% in subsequent periods. Country of publication showed some changes, with a decline for the United States from 42% of all publications in period 1 to 27.8% and 18.4% in subsequent periods. Marked increases were noted for Spain, China and Brazil since 2017, compared to earlier periods. The type of journal was classified as established journals and newer journals offering online publication or utilising a business model. The proportion of all PA publications in business-model journals increased from zero (period 1) to 7.7% (period 2), and 39.6% (period 3). Among the leading 25 journals, the business-model journals comprised 77.3% of all publications in period 3. **Conclusions.** Increases in physical activity participation seemed to be particularly driven by recent entrants in the category of for-profit business-modelled journals. The increase may result from intensive marketing, a plethora of special issues, and higher acceptance rates. This influences the quality of physical activity papers published and fosters rapid publication of cross-sectional studies or those using easily accessible data. This is further exacerbated by the proliferation of 'predatory' journals, which are outside this review, as they are not listed in mainstream databases.

### Effectiveness of a sit less, move more program for desk-workers: findings from the national implementation trial of BeUpstanding,

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**Introduction.** National policy advice to reduce workplace sitting has shown the need for evidence-based programs such as BeUpstanding™. A workplace 'champion' delivers the 8-week program, using the online toolkit's step-by-step guide and associated resources, with their work team collectively choosing the sit less / move more strategies they will implement and promote. This present study reports on the effectiveness outcomes from the national implementation trial

of BeUpstanding. **Methods.** A single-group repeated measures design tested effectiveness. Pre- to post-program changes in survey-reported outcomes (sitting [primary outcome], standing and moving as % of worktime, % of work sitting in prolonged bouts, activity preference alignment, work culture, engagement, job performance, job satisfaction, creativity, stress, sick days, physical and psychological health, and musculoskeletal discomfort) were tested via linear mixed-models correcting for clustering and repeated measures. Post-program staff experiences (5 items) and adverse events were also described. Analyses were by evaluable cases. **Results.** The trial recruited 135 of 166 eligible desk-based workplaces (81%) from the 745 that unlocked the toolkit between June 2019 and September 2021. Staff evaluation data were collected from 67 workplaces (1832-1911 staff). Work sitting (-8.4 [95% CI: -9.8, -7.1] %; ≈40 min/8 h) and percent of work sitting accrued in prolonged bouts (-9.1 [-11.0, -7.1]%) decreased significantly (p=0.05), with associated p=0.05 increases in work standing (6.5 [5.5, 7.4]%) and moving (1.9 [1.2, 2.7]%) Significant (p=0.05) improvements were seen in all of the remaining outcomes except for engagement, feeling part of a team, creativity, job satisfaction and sick days and stress (all p=0.05). Staff seldom perceived negative program impacts (0%-2%) and many perceived positive benefits (47%-80%) of the program. Few staff (4%) reported they experienced an adverse event and only 1% provided detail confirming their adverse event (always musculoskeletal or psychological). **Conclusions.** Findings indicate that BeUpstanding is effective at reducing workplace sedentary time, with average reductions equivalent to approximately 40 minutes per 8-hour workday, as well as providing benefit to several other outcomes. Trial learnings are being used to update the program for widescale dissemination.
**Conflict of Interest.** BeUpstanding provides consultancy options within the toolkit, with any proceeds used to advance research.

**Reporting activity patterns: A modified Delphi study**

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**Introduction.** There has been increased interest in examining the way in which physical activity and sedentary behaviour are accumulated throughout the day. While emerging research suggests that these "activity patterns" may be important for health, there has been little consistency in the way activity patterns have been operationalised and reported. This study aimed to establish a consensus for a framework for reporting activity patterns research. A secondary aim was to gain consensus on examples of activity patterns. **Methods.** The activity patterns literature was searched to identify experts to receive an invitation to participate in the study. A three-round modified Delphi survey was conducted online (November 2021 to May 2022). In round one, participants were asked to rate their agreement with six examples of activity patterns, which were drawn from previous research, and eight items for reporting activity patterns in the literature. Open-ended questions were also included to enable participants the opportunity to provide comments and suggestions for additional items. Consensus was defined a priori as 80% of participants rating their agreement with an item. Following round one, two additional items for the reporting framework were added, and four activity pattern examples were amended. In rounds two and three, participants rated their agreement with the 10 items for the framework for reporting activity patterns, and six examples of activity patterns. **Results.** Twenty participants with expertise in activity patterns research participated in round one, with response rates of 80% and 60% in rounds two and three, respectively. All 10 items in the activity patterns reporting framework and four examples of activity patterns achieved consensus. **Conclusions.** This modified Delphi study achieved consensus for the activity patterns reporting framework. Items include providing detail about which activity pattern components have been investigated, how data have been processed, and providing a rationale for examining different components (e.g., time periods, bout lengths, etc, where applicable). This framework will improve the reporting of activity patterns within the literature. Interestingly, the two activity pattern examples that did not achieve consensus were historical examples of activity patterns (e.g., seasonal differences), suggesting changes in the use of this term over time.

**Different analysis methods, same answer? Practical implications of different ways to estimate treatment effects in RCTs**

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**Introduction.** The selection of which method to use to analyse RCTs appears to be driven more by field norms or 'we do it this way' rather than an appreciation for the potential implications that different approaches can have on trial conclusions. The imbalance between groups at baseline and the pre-post correlation can impact trial conclusions depending on the method applied. This simulation study compares estimates of treatment effects, precision and power obtained by linear mixed models (LDA), baseline adjusted ANCOVA, and constrained linear mixed models (cLDA) when

analysing a RCT. **Methods.** Using Stata MP 17, data for a 2 arm RCT with 3 time points (baseline, post-test, follow-up) was simulated. Data were simulated over 98 scenarios manipulating the magnitude of baseline imbalance (the intervention group was lower (negative imbalance [cohen's d -0.3 - -0.1]), equal (~0.0), higher (positive imbalance [0.3 - 0.1])), the pre-post correlation (r = 0.3 - 0.9), and the presence of missing data (complete case, available cases) at post-test (20%) and follow-up (33%). Treatment effects were estimated using ANCOVA, LDA, and cLDA for each scenario and simulated 1000 times. **Results.** Across all pre-post correlations, LDA overestimated and underestimated treatment effects relative to ANCOVA when baseline imbalance was negative and positive respectively. This bias increased as the baseline imbalance increased in either direction. The differences were greatest when pre-post correlation was low (r=0.30) and decreased with increasing magnitude of correlations. When groups were equal, all estimates were comparable. In all scenarios, standard errors of LDA were higher relative to ANCOVA indicating lower precision. Across all correlations the power of all tests reduced with increasing positive imbalance and were most pronounced for LDA. LDA displayed greater power at the greatest negative imbalances (-0.2, -0.1) and when correlations were ≤0.4, in all other scenarios ANCOVA displayed comparable or greater power. ANCOVA and cLDA were comparable in terms in treatment estimate, precision and power across all scenarios. **Conclusions.** ANCOVA provides less biased estimates, greater precision and power relative to LDA is the recommended method.
**Conflict of Interest.** The author declares no relevant conflict of interest relevant to this submission.

### Aotearoa New Zealand's 2022 Report Card on Physical Activity for Children and Youth

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**Introduction.** Aotearoa New Zealand (NZ) has contributed to the Active Healthy Kids Global Alliance's (AHKGA's) Global Matrix since 2014. The AHKGA coordinates country-specific physical activity Report Cards for raising awareness and advocating for policies and environments that promote health and wellbeing for children and youth. This presentation outlines the methods and findings for NZ's 2022 Report Card on Physical Activity for Children and Youth indicators, and on inequities within these indicators. **Methods.** Twelve indicators and their benchmarking criteria were aligned as closely as possible with the AHKGA criteria, but ultimately our criteria were dependent on data availability. Two additional indicators were included in this report card: Sleep, and Physical Literacy. Data sources including national surveys from 2019 to March 2020 (signalling the arrival of COVID-19 to NZ) were identified through previous report cards, networks, and academic and grey literature. Where possible, we explored differences by gender, ethnicity, disability status, and area-level socio-economic status, urbanicity, and age (using school year). Grades were determined based on the proportion meeting established benchmarking criteria and approved by the NZ working group. **Results.** Grades were assigned to indicators as follows: Overall physical activity: C+, Organised sport and physical activity: B-, Physical literacy: B, Active transportation: D, Sedentary behaviours: C-, Sleep: B+, Whānau (family) and peers: D, School: C+, Government: A. Inequities across all socio-demographic variables were observed. An 'inconclusive' grade was assigned to the Active play, Physical fitness, and Community and Environment indicators due to insufficient data. **Conclusions.** It is imperative that targeted, comprehensive, and population-specific approaches are implemented to support health-promoting physical activity behaviours and reduce inequities among children and youth in NZ. There is a need to promote all dimensions of physical activity (overall activity, active play, recreation, organised sport, active transportation) and the reduction of screen time through policy, research, evidence-based social marketing campaigns, and urban design. Regular, nationally representative surveys that enable the consistent and regular measurement of key Report Card indicators are needed.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

## Physical Activity & Mental Health

### Te Hekenga Whaiora: A co-designed system of support for the health of young people experiencing first episode psychosis

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**Introduction.** People experiencing psychosis often suffer from poor physical health, the result of complex interactions between medication adverse effects and maladaptive health behaviours (e.g., physical inactivity, unhealthy eating, smoking, substance abuse). Modifiable health behaviours (e.g., regular physical activity, abstinence from smoking, alcohol, and other substances) can significantly mitigate health risks, but it is critical that intervention or support for such behaviours occurs early - at the onset of first episode psychosis (FEP) - before unhealthy habits and associated health conditions take hold. Further, any intervention or system of support must draw from the lived experiences of people living with psychosis and the barriers they face in remaining 'healthy' within the context of healthcare services. **Methods.** An iterative experience-based co-design was used to develop a system of support for the health of young people experiencing FEP within early intervention services. Participants included FEP service users (n = 12), whānau (n = 3), and health service providers (n = 15). The co-design process incorporated indigenous Māori knowledge and creative outputs by which young people could communicate their lived experiences. Data collection involved a series of workshops, surveys, and interviews, resulting in a combination of qualitative and quantitative data. Thematic analysis was used to understand the qualitative data. The second part of the co-design process involved collecting qualitative and quantitative data regarding perceived value and feasibility of the components of the co-designed system of support. **Results.** We will present our qualitative findings regarding the lived experience of young people leading healthy lives while living with psychosis, focusing on the themes of empowerment, identity, finding meaning, stigma, and social connection. We will also present the results of the co-design process, including data regarding perceived value and feasibility of the co-designed system of support. **Conclusions.** Co-design processes that account for the lived experience of people living with serious mental illness should guide mental health care. This research provides a template for such co-design, in addition to tangible outcomes that support the health and well-being of those experiencing FEP.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**A multi-behavioural home-based intervention for reducing depressive symptoms at postpartum: The Food, Move, Sleep (FOMOS) randomised controlled trial**

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**Introduction.** Postnatal depression (PND) is estimated to affect 23-64% of women globally and poses a significant health risk for new mums. Health behaviours such as physical inactivity, sedentary behaviour, poor sleep, and sub-optimal diet quality are known risk factors for PND. However, motherhood often presents unique barriers to engaging in healthy behaviours. There is, therefore, a need for a feasible, sustainable, and scalable intervention to improve healthy behaviours and reduce PND symptoms amongst women at postpartum. Here, we detail the development of the Food, Move, Sleep (FOMOS) multi-behavioural home-based intervention for improving PND symptoms in women at postpartum. **Methods.** Australian women who are 2-12 months postpartum and experiencing heightened PND symptoms (Edinburgh Postnatal Depression Scale score <10) will be recruited (n=220) from July 2023 and randomly allocated to the FOMOS intervention group or wait-list control. FOMOS is a 6-month intervention targeting diet quality, physical activity, sedentary behaviour, sleep, and mental health through the provision of exercise equipment, educational and motivational materials, and social support via eHealth and social media. The development and co-design of FOMOS was informed by pilot interventions as well as input from key stakeholder organisations and consumers (women with previous and/or current experience of heightened PND symptoms). Grounded by the Social Cognitive Theory, FOMOS will focus on promoting healthy behaviours by incorporating sustainable behaviour change techniques defined in the CALO-RE taxonomy and Cognitive Behavioural Treatment of Insomnia. **Results.** Data collection pre-intervention and at 3, 6 and 12 months will assess the primary outcome of PND symptoms and secondary outcomes (diet quality, physical activity, sitting time, sleep quality) using self-report and device measures. Process evaluation will explore acceptability, appropriateness, cost-effectiveness, feasibility, and sustainability via analytic tools, record keeping, interviews, and surveys. **Conclusions.** This trial will provide important evidence to determine whether a multi-behavioural home-based intervention is efficacious for improving PND symptoms in women at postpartum. The outcomes of this study will provide valuable insights for healthcare providers, policymakers, and researchers seeking evidence-based interventions to address the challenges.
**Conflict of Interest.** The authors declare no competing interests.

**The impact of Green Prescription on sustained physical activity levels, quality of life, and mental health**

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**Introduction.** Physical inactivity is a major public health problem in Aotearoa New Zealand, contributing to obesity as well as other physical and mental health conditions such as diabetes, depression, and anxiety. This often leads to expensive medical treatments being required for treatment and a decreased quality of life among numerous New Zealanders each year, especially Māori who are disproportionately affected by such conditions. It is, therefore, important to assess the efficacy of programs such as Green Prescription which combines physical activity, nutrition, and lifestyle advice with the aim of bringing about sustained increased physical activity and improved quality of life among those who complete the program. Previous studies had found Green Prescription to contribute to sustained physical activity levels, but no studies had investigated its impact on quality of life. As such, this study aimed to assess the impact of Green Prescription on sustained levels of physical activity, quality of life, and mental health. **Methods.** 720 former Green Prescription Otago participants were invited to complete online surveys to gather the data among which 102 participated. They completed the New Zealand World Health Organisation Quality of Life Questionnaire, General Anxiety Scale-7, Patient Health Questionnaire 9, and New Zealand Physical Activity Questionnaire (Short Form). **Results.** Statistically significant improvements in mental health outcomes were found among participants who had attended 4 or more Green Prescription sessions (completion group) as compared to those who had attended 3 or fewer sessions (non-completion group). Quality of life outcomes were also found to be higher among the completion group, however, sustained levels of physical activity were found to be lower among them. These differences were, however, not statistically significant. **Conclusions.** Findings indicated that attending 4 or more sessions of Green Prescription improved participants' quality of life and significantly improved their mental health, but also decreased their sustained levels of physical activity. Sampling bias may have influenced these findings, therefore, further studies with larger sample sizes are required for verification of the findings.

**Association between sports participation and health related quality of life of Australian children: A longitudinal study**

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**Introduction.** Participation in sports is positively associated with children's mental wellbeing; however, the existing evidence is predominantly based on cross-sectional, non-representative or small sample studies. This study aimed to examine longitudinal association of sports participation with health-related quality of life of school-aged children in Australia. **Methods.** Data were from five waves of the Longitudinal Study of Australian Children (LSAC) aged 6-7 years in 2010 (n=4,242) and followed-up till 2018 (n=3,127). Participants were a nationally representative sample of Australian children at baseline. Child general health and functional status were measured using the multi-dimensional Pediatric Quality of Life Inventory (PedsQL) whose total score (range: 0-100) was used as the outcome. Sports participation was measured using two items about regular participation in team sports and individual sports. Multilevel mixed-effects linear regression modelling was used to estimate the associations, adjusted for a set of covariates. **Results.** The analysis showed that sports participation was beneficially associated with health-related quality of life of school-aged children with team sports having had stronger association than individual sports across gender. Compared to non-participation in any sports, boys who participated in team sports had 4.48 points higher PedsQL score (β=4.48; 95% CI: 3.85-5.12), and PedsQL score was 1.73 points higher for individual sports participation (β=1.73; 95% CI: 0.94-2.52). In girls, PedsQL score was 3.44 points higher for team sports participation (β=3.44; 95% CI: 2.76-4.11) and 1.97 points higher for individual sports participation (β=1.97; 95% CI: 1.32-.63). Participation in both team and individual sports had the strongest association with 5.02 points higher PedsQL score in boys (β=5.02; 95% CI: 4.32-.72) and 3.82 points higher PedsQL score in girls (β=3.82; 95% CI: 3.12-4.52). Additional analysis showed that longer exposure to sports participation was positively associated with better quality of life. **Conclusions.** Using nationally representative eight-year follow-up data, the present study shows that regular participation in team and individual sports can benefit children's health-related quality of life with team sports being more beneficial than individual sports. Encouraging children to regularly participate in sports can help to optimise their mental wellbeing.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Association of physical activity and mastery with psychological distress in mid-aged adults over nine years**

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**Introduction.** Psychological distress is highly prevalent and associated with significant adverse health outcomes and economic burden. Physical activity is a potential behavioural resource to reduce distress and may relate to mastery, a psychological resource to reduce distress; however, previous research has not examined the potential interactive

relationship with mastery over time. The purpose of this study was to explore associations between physical activity, mastery, and distress in mid-aged adults over nine years. **Methods.** Data from a longitudinal mail survey study including items assessing time spent in physical activity, Pearlin Mastery Scale, and Kessler 6 were examined in a population-based sample of 4404 adults aged 40 to 54 years at baseline. Group-Based Trajectory Models were used to examine trajectories of psychological distress over nine years. Generalized Estimating Equations were used to assess physical activity and mastery, adjusting for sociodemographic and health variables, as predictors for the probability of distress trajectory membership. **Results.** There were two distinct trajectories of psychological distress (elevated and low). The odds of elevated distress over time were significantly reduced in people doing at least 150 min/week of physical activity (OR = 0.81; 95% 0.68-0.96) and those with higher mastery (OR = 0.13; 95% 0.11-0.15). There was no significant interaction between mastery and physical activity. **Conclusions.** Meeting physical guidelines may be an important resource to mitigate distress in mid aged adults. Further research is needed to evaluate related interventions promoting these resources and the impact on mid-aged adults experiencing psychological distress.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

# Early Childhood

### Preschool children's physical activity within and outside of the neighbourhood: A latent profile analysis using device-based measures.

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**Introduction.** There is a significant evidence gap around using 'location-specific' physical activity data to explore the characteristics of physical environment domains where preschool children are physically active. A latent profile analysis approach using device-based physical activity location data can address this evidence gap by classifying preschool children into subgroups based on where they accumulate physical activity. We explored profiles of preschool children based on which environmental domains they accumulate moderate to vigorous physical activity (MVPA), and investigated the underlying characteristics of the physical environmental features within each profile. **Methods.** A GIS map layer of the Perth and Peel region (Western Australia) was imported into ArcGIS Pro for analysis. Combined 7-day accelerometer and Global Positioning System (GPS) data from 115 preschool children aged 2 to 5 years old was analysed in ArcGIS Pro to identify where preschool children accumulated MVPA within five environmental domains: 1) home, 2) childcare, 3) <500m from home, 4) 500-1600m from home, and 5) <1600m from home. Latent profile analysis was performed with the five environmental domain specific mean minutes of MVPA as outcome variables. Independent t-tests were performed to explore if there were any significant differences between profiles in terms of the physical environmental characteristics of each domain. **Results.** Three profiles were identified: 'Home bodies' (n=41), 'Active except close to home' (n=61), and 'Active except in local neighbourhood' (n=13). Compared to other profiles, 'Home bodies' had less parks and playgrounds within their 500-1600m neighbourhood and the 'Active except in local neighbourhood' profile had fewer sports and recreation centres within the <500m neighbourhood (both P<0.05). The 'Active except close to home' profile had less school grounds within the <500m neighbourhood, but more parks and playgrounds and sport and recreation centres in their 500-1600m neighbourhood compared to the other two profiles (all P>0.05). **Conclusions.** Findings suggest preschool children's MVPA profiles are reflections of their physical environmental opportunities. Future policy and planning should consider that local access to parks and playgrounds, school grounds and sport and recreation centres is important for supporting young children to be physically active.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Improving physical development in early childhood through the use of the Movement Environment Rating Scale: A cluster randomised trial

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**Introduction.** The quality of early childhood education and care (ECEC) settings has a profound influence on children's outcomes. However, most ECEC physical activity interventions do not consider the quality of the environment, rather focus only on increasing time spent in physical activity. High quality ECEC movement environments include, in part,

opportunities for physical activity inside and outside, interactions between educators and children and movement vocabulary. The aim of this study was to investigate the impact of the MOVERS professional development (PD) program on improving quality of the movement environment in ECEC settings. **Methods.** A randomised controlled trial involving 41 ECE centres was implemented in 2021/2022. 20 centres were randomised to the intervention group and 21 were randomised to the wait-list control group. Intervention centres participated in ongoing PD and mentoring (face-to-face and online) over 6 months. The PD was underpinned by Guskey's Model of Teacher Change. Trained assessors, blind to group allocation, collected all data. The main outcome was change in the quality of the movement environment in ECEC centres. Complete case analysis and imputation were conducted using linear regression. Effect sizes were also calculated. Process evaluations (questionnaires and semi structured interviews) were completed throughout the intervention. **Results.** At 12-months, significant increases in the movement environment quality (total score and subscales: all $p<0.005$) were reported (adjusted models). Effect sizes were medium to large. Process evaluations showed high educator enjoyment and engagement and educators reported changes in their own pedagogy and practice and children's behaviours. **Conclusions.** The MOVERS PD program addresses the dearth of national and international PD focusing on children's physical activity and development. It highlights the potential of multi-modal PD and the capacity of educators to successfully learn, adapt and modify both their pedagogy and environment. Physical activity and physical development are underrepresented in ECE curricula, pedagogy and practice, yet is profoundly important in children's holistic growth and development.
**Conflict of Interest.** The Victorian Department of Education provided funding for the research project. The findings and views expressed in this paper are those of the authors and should not be directly attributed to the Department of Education.

**Play Active physical activity policy in early childhood education and care: Post-implementation evaluation.**

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**Introduction.** Early childhood education and care (ECEC) is an important setting for promoting physical activity (PA) in 0-5-year-olds. Findings from our recent RCT showed ECEC-specific PA policy supported by evidence-based implementation strategies improved educator PA practices. The next stage involves scaling up Play Active for delivery nationally. However, further data is needed to inform the adaptation of Play Active for scale-up to the ECEC sector. The study aimed to explore ECEC educator's post-implementation experiences of 1) the Play Active policy; 2) the Play Active implementation support strategies; and 3) elicit possible adaptions required for scaling up Play Active. **Methods.** This study utilized a qualitative descriptive approach within a naturalistic framework. Play Active intervention service educators (n=27) participated. A discussion guide was developed and 30-minute individual interviews (n=11) or focus groups (n=4) were held August-September 2022. Data was grouped using a pre-defined Consolidated Framework for Implementation Research-informed coding framework followed by an inductive thematic analysis. **Results.** Participants were highly positive about Play Active. Acceptability and appropriateness were high however, feasibility was impacted by Covid-19 and competing daily priorities. Implementation barriers included Covid-19, adverse weather, space and equipment, time constraints and casuals/high staff turnover. Implementation enablers were leadership, communication and 'champions'. Several Play Active implementation strategies were considered useful (resource guide, online professional development and phone support). Scale-up adaptations suggested included PA policy legislation, cultural and contextual supports, regional networking for sharing of ideas, local community involvement, family engagement, staff capacity building, pre-implementation ECEC needs assessment and minimising 'red tape'. **Conclusions.** Play Active was well received by ECEC services. Most barriers reported were systemic and difficult to overcome, highlighting the importance of enlisting key stakeholders in the ECEC sector. The Play Active implementation strategies appeared to increase implementation of Play Active, though longer policy implementation periods were needed. ECECs provided several helpful adaptations for scale-up. To avoid 'voltage drop' at scale-up the use of a scalability assessment and adaptation framework is recommended.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Effect of staff professional development on preschooler`s fundamental motor skills and physical fitness: The ACTNOW cluster randomized controlled trial**

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**Introduction.** Fundamental motor skills (FMS) and physical fitness (FIT) play important roles in child development and provide a foundation for lifelong participation in physical activity (PA). However, since many children have suboptimal levels of PA, FMS, and FIT, efficient strategies to improve PA, FMS, and FIT, are needed. The Active Learning

Norwegian Preschool(er)s (ACTNOW) study investigated the effects of an 18-month staff-led PA intervention on FMS and FIT in 3–5-year-old children. **Methods.** A total of 819 preschoolers aged 3–4 years (3.8 yr, 54 % boys) from 46 preschools in Western Norway were cluster-randomized by preschool into an intervention (n=23[381]) or a control group (n=23[438]). Intervention preschools participated in an 18-month PA intervention involving professional development of staff between 2019 and 2022. PA was measured with accelerometers (ActiGraph GT3X+). FMS were evaluated using a test battery (9 items) covering the three domains: locomotor, object control, and balance skills. FIT was assessed through motor fitness, handgrip strength, and standing long jump. All measures took place at baseline, 7-, and 18-month follow-up. Effects were analysed using a repeated measures linear mixed model with child and preschool as random effects and with adjustment for baseline differences. **Results.** Findings showed positive and significant effects for object control skills at 7-months (standardized effect size (ES)=0.17) and locomotor skills at 18-months (ES=0.21). A negative effect was found for handgrip strength (ES=-0.16) at 7-months. During preschool hours, SED decreased (ES=-0.18) and LPA (ES=0.14) and MVPA (ES=0.16) increased at 7-months, whereas LPA decreased at 18-months (ES=-0.15). **Conclusions. T**he ACTNOW intervention improved some FMS outcomes and improved SED, LPA, and MVPA short-term. Further research is needed to investigate how to improve effectiveness of staff-led PA interventions and achieve sustainable improvements in children's PA, FMS, and FIT.
**Conflict of Interest.** The authors declare that they have no conflict of interests.

### Playgrounds and children's health: A scoping review

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**Introduction.** Many studies indicate that playgrounds are important for children's health and development. However, more specific knowledge on the influence of the use of playgrounds on children's health is fragmented. The objective of this review is to create a global, interdisciplinary overview of all research that is relevant when studying the influence of playgrounds on children's health. This evidence overview can be used to work together in creating more and better places to play for more children. **Methods.** Included studies examine the association between playground use and a positive physical, mental or social health outcome. Playgrounds are defined as a place designed or designated to facilitate play. We included studies published in English since January 2000, and available in one of the following databases: Scopus, Web of Science, SportDiscus, and PsycInfo. Covidence was used throughout the screening process. For all included studies, data on setting, study design, the role of the playground, population description and outcomes has been extracted. **Results.** 66,279 studies were identified and after duplicate removal, the title and abstract of 42.108 studies were screened. 2,388 articles were included for full-text screening. After full-text screening, data from 253 studies, including 28 reviews, were extracted. The majority of studies took place in a school playground context and had a physical activity related outcome. There were several school-based studies with different physical health outcomes, and some that focused on social and mental health. A second large setting for studies was the playground of Early Childhood Education and Care (ECEC) centres. Studies on public playgrounds were scarce. **Conclusions.** This review has shown that playgrounds are not just for fun, they are essential for children's health and well-being. This can be used as arguments for improving existing playgrounds, or creating new playgrounds by city-planners, recreation departments, schools, and other stakeholders.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work. This study was funded by KOMPAN, a large international playground company. KOMPAN has not had any influence on the methods, results or conclusion.

## Clinical Populations & Outcomes II

### Device-measured physical activity and sedentary behaviour changes in people with hip and knee osteoarthritis: A pilot trial

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**Introduction.** To support independent community living, people with osteoarthritis (OA) should take part in a minimum amount of moderate to vigorous intensity physical activity (MVPA) and minimise their sedentary behaviour (SB) as much

as possible. PA and SB levels measured using accelerometry have not yet been described in people with OA in New Zealand. The aim of this study was to determine the effect of an exercise and education intervention on PA and SB in people with OA. **Methods.** This study presents a preliminary analysis of the control group from a superiority trial (ACTRN12620001281987.aspx; 26/11/2020) to determine the effects of a behaviour change, education and exercise intervention on PA and SB levels in people clinically diagnosed with hip or knee OA. People older than 18 years of age (n=15) undertook an individualised exercise programme a minimum of once a week for 8 weeks. Participants also received educational resources on OA and exercise at the start of the intervention. Participants had their PA and SB measured using an activPAL accelerometer before and after the intervention. **Results.** Before the start of the intervention, people with hip and knee OA took a mean (SD) of 7925 (2660) steps/day, spent 95.5 (26.0) min/day stepping, 11.4 (2.3) min/day in sedentary behaviour, and made 52 (11) transitions between sitting and standing per day. Participants spent 43.3 (12.8), 56.0 (24.2), and 1.3 (4.3) min/day stepping at cadences of <75, between 75 and 125, and <125 steps/min. Most (9 out of 15) participants did not accumulate sufficient weekly time in moderate intensity activity. There were no differences in PA or SB levels following the exercise intervention. **Conclusions.** Preliminary analyses from our pilot study have shown that the majority of New Zealanders with OA engage in half the amount of weekly physical activity required for good health and spend high amounts of time sitting. An exercise intervention alone may not be sufficient to change activity behaviours in people with OA and behaviour change techniques should be incorporated into exercise interventions.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Using rugby league clubs to reduce diabetes risk in overweight and obese men: League-FIT**

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**Introduction.** Sports clubs provide a powerful and comfortable gender-sensitised environment to engage men for health promotion. There is robust evidence for the effectiveness of weight-loss programs in men for soccer. However, evidence for the popular Australian sport of rugby league, has yet to be examined for weight-loss programs in men. The aim of this study was to examine the efficacy of a gender-sensitised weight-loss intervention on Type II diabetes risk, as indicated by several outcomes including weight-loss (primary outcome), waist circumference, HBA1C, and physical activity. **Methods**. Male supporters from three local Brisbane rugby league clubs were recruited. Inclusion criteria were men aged 35-65 years old, with a BMI of at least 28 kg/m2. Participants received 12-weekly, 90-minute sessions, delivered at the clubs. Sessions comprised of 1) education about behavioural risks, and weight loss management. 2) physical activity tailored to the fitness levels of participants. A coach connected to the club delivered both education and physical activity components. Paired t-tests assessed changes in outcome measures collected pre and post intervention. P-values were based on two-sided tests and considered statistically significant at $p<0.05$). **Results.** 67 men started League-FIT (mean age 47.8, SD 8.6). Using intention to treat analysis there was a significant weight loss, with an average reduction of 4.5kg (SD 4.6; $P<0.001$). There were also significant reductions for waist circumference (mean difference 5.3cm; SD 4.9; $p<0.001$); HBA1C (mean difference 0.13; SD 0.35; $p=0.006$); and alcohol consumption (mean difference 6.4 units; SD 17.7; $p=0.005$). There was a significant increase in moderate to vigorous physical activity (mean difference 14.9 minutes; SD 22.3; $p<0.001$). **Conclusions.** The positive changes in outcome data related to Type II diabetes risk provides evidence for the efficacy of the League-FIT weight-loss program for men, delivered at community rugby league clubs. The average weight-loss is in line with similar programs for different sports (e.g. soccer). The average weight reduction of 4.5kg, represents a 4.8% weight-loss, which is associated with considerable health benefits for overweight and obese populations, reducing the risk of a number of comorbidities.
**Conflict of Interest.** Authors declare no relevant conflict of interest in relation to this work.

**Device-measured physical activity and cardiometabolic risk factors in children and adolescents: A cross-sectional analysis from the SEACO-CH20 study**

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**Introduction.** Adolescent physical activity (PA) levels are concerningly low, with only 15-22% globally meeting recommended WHO guidelines. This contributes to the rising burden of cardiometabolic risk factors, particularly in developing economies. Therefore, we aimed to explore the associations between 24-hour accelerometer-measured physical activity (PA) and cardiometabolic health among children and adolescents, to address the paucity of research on this topic in Malaysia. **Methods.** Participants (N=491) were children and adolescents (8-18 years) from the South East Asia Community Observatory (SEACO). Wrist-worn AX6 accelerometers measured PA 24 hours a day over seven days. Anthropometrics (BMI z-scores, waist circumference (WC)) and blood pressure (BP) were assessed, in addition to fasting lipids and glucose levels in a subset (n=134) with blood samples. Cardiometabolic risk factors were described by quartiles representing distinct categories of PA. We examined associations between inactivity and moderate-to-vigorous PA (MVPA), with cardiometabolic risk factors using multiple linear regression. **Results.** More time spent inactive (min/day) showed potential connections with a higher body mass index (BMI) z-score (β=0.06, 95% CI: -0.03, 0.15), waist circumference (β=0.06, 95% CI: -0.03, 0.15), and systolic BP (β=0.07, 95% CI: -0.02, 0.15). However, the 95% confidence intervals include a range of values that imply insufficient evidence to firmly establish these associations. MVPA showed potential links to reduced lipid and fasting glucose levels, whereas inactivity appeared to be correlated with higher values of these markers. When compared to MVPA, inactivity demonstrated relatively larger coefficients for associations with triglycerides (β=0.12, 95% CI: -0.06, 0.30) and fasting glucose (β=0.21, 95% CI: 0.03, 0.39), while MVPA exhibited a somewhat stronger association with LDL-C (β=-0.11, 95% CI: -0.31, 0.09). It's important to note, however, that most of these associations were weak and inconclusive. **Conclusions.** Using accelerometer-measured PA, we observed cross-sectional patterns hinting at associations between higher PA and better cardiometabolic health in Malaysian children and adolescents, although we recognise the absence of a clear link. Moving forward, longitudinal and intervention studies are warranted to establish causal associations to better understand the impact of PA.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**If you measure it, it matters! Factors influencing implementation of physical activity promotion in cardiac and pulmonary rehabilitation in Australia.**

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**Introduction.** In people with coronary heart disease and chronic obstructive pulmonary disease increased physical activity decreases morbidity and all-cause mortality. Accordingly, exercise and physical activity are core components of cardiac and pulmonary rehabilitation programs internationally. However, both cardiac and pulmonary rehabilitation patients have found it difficult to meet and sustain the physical activity guidelines Therefore, the aim of this study was to identify factors related to the frequency of physical activity promotion by health professionals working in cardiac and/or pulmonary rehabilitation in Australia to guide future implementation strategies. **Methods.** A cross-sectional online survey of health professionals working in cardiac and/or pulmonary rehabilitation in Australia was conducted between July and November 2022. **Results.** A total of 71 health professionals from four disciplines (physiotherapy, nursing, exercise physiology, occupational therapy) completed the survey. The majority agreed that physical activity promotion was part of their role. Despite this, only half of the participants encouraged <10 patients per month to be more physically active. In logistic regression modelling, health professionals that measured patient's physical activity levels (odds ratio 8.04, 95% confidence level 1.45-44.19) and prioritised physical activity promotion regardless of other patient problems (odds ratio 3.3, 95% confidence level 0.74-14.82) were much more likely to frequently promote physical activity to patients. **Conclusions.** Measurement of patient's physical activity levels within cardiac and pulmonary rehabilitation and making physical activity promotion a priority may impact the implementation of physical activity promotion within these programs. Physical activity measurement as a key performance indicator in cardiac and pulmonary rehabilitation is indicated. This may be an important strategy to increase physical activity promotion by cardiac and pulmonary rehabilitation health professionals.
**Conflict of Interest.** The authors declare that there are no conflicts of interest.

**Effect of a smartphone app on hospital admissions and sedentary behaviour in cardiac rehabilitation participants: ToDo-CR randomised controlled trial**

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**Introduction.** People with coronary heart disease are at increased risk of morbidity and mortality, even if they attend cardiac rehabilitation. Sedentary behaviour remains high in this group and potentially contributes to this morbidity. Behavioural smartphone applications may be feasible to facilitate sedentary behaviour reductions and lead to reduced healthcare utilisation. Therefore, the aim of this study was to test the effect of a sedentary behaviour change smartphone application (Vire app and ToDo-CR program) as an adjunct to cardiac rehabilitation on hospital admissions and emergency department (ED) presentations over 12-months. **Methods.** A randomised controlled trial was conducted with 120 participants recruited from cardiac rehabilitation programs in Canberra, Australia. Participants were randomised 1:1 to cardiac rehabilitation plus the 6-month Vire app and online ToDo-CR program (intervention) or usual care cardiac rehabilitation (control). The primary outcome was non-elective hospital admissions and ED presentations over 12-months. Accelerometer-measured sedentary behaviour and physical activity was recorded at baseline, 6- and 12-months. Logistic regression models and linear mixed-effects models were used in the analysis. Intervention and hospital admission costs were used to calculate incremental cost-effectiveness ratios (ICER). **Results.** Intervention group participants were more likely to experience all-cause (OR 1.54, 95% CI 0.58 to 4.10, p=0.39) and cardiac-related (OR 3.26, 95% CI 0.84 to 12.55, p=0.09) hospital admissions and ED presentations (OR 2.07, 95% CI 0.89 to 4.77, p=0.09) compared to the control. Despite this, 12-month cardiac-related hospital admission costs were lower in the intervention group ($252.40 vs $859.38, p=0.24). There were no significant between-group differences in light- or moderate-to-vigorous intensity physical activity or sedentary behaviour minutes-per-day over 12-months, though the intervention group completed 22-minutes less than the control, with a small effect size (95% CI -22.80 to 66.69, p=0.33, Cohen d=0.21). The intervention was more effective but also more costly in reducing sedentary behaviour (ICER $351.77) and increasing physical activity (ICER $643.65). **Conclusions.** The Vire app and ToDo-CR program did not reduce hospital admissions and ED presentations. Nonetheless, it appeared to reduce 12-month cardiac-related hospital admission costs and had a small effect on reducing sedentary behaviour.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

# Technology

### Increasing physical activity using a just-in-time adaptive digital assistant supported by machine learning: A novel approach for hyper-personalised mHealth interventions

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**Introduction.** Population-based interventions to increase physical activity are needed. Existing automated expert systems have significant limitations that result in low long-term effectiveness. Therefore, innovative approaches are needed. This study aims to describe and discuss a novel mHealth intervention approach that proactively offers participants with hyper-personalised intervention content adjusted in real-time. **Methods.** Using machine learning approaches, we propose a novel physical activity intervention approach that can learn and adapt in real-time to achieve high levels of personalisation and user engagement, underpinned by a likeable digital assistant. It will consist of three major components: 1) conversations: to increase user's knowledge on a wide range of activity-related topics underpinned by Natural Language Processing; 2) nudge engine: to provide users with hyper-personalised cues to action underpinned by reinforcement learning (i.e., contextual multi-armed bandit) and integrating real-time data from activity tracking, GPS, GIS, weather, and user provided data; 3) Q&A: to facilitate users asking any physical activity related questions underpinned by generative AI (e.g., ChatGPT, Bard) for content generation. **Results.** The detailed concept of the proposed physical activity intervention platform demonstrates the practical application of a just-in-time adaptive intervention applying various machine learning techniques to deliver a hyper-personalised physical activity intervention in an engaging way. Compared to traditional interventions, the novel platform is expected to show potential for increased user engagement and long-term effectiveness due to: 1) using new variables to personalise content (e.g., GPS, weather), 2) providing behavioural support at the right time in real-time, 3) implementing an engaging digital assistant and 4) improving the relevance of content through applying machine learning algorithms. **Conclusions.** The use of machine learning is on the rise in every aspect of today's society, however few attempts have been undertaken to harness its potential to achieve health behaviour change. By

sharing our intervention concept, we contribute to the ongoing dialogue on creating effective methods for promoting health and well-being. Future research should focus on refining these techniques and evaluating their effectiveness in controlled and real-world circumstances.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Using automated wearable cameras to categorise the type and context of screen-based behaviours among adolescents: An observational study**

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**Introduction.** Automated wearable cameras present a new opportunity to accurately assess human behaviour. However, this technology is seldom used in the study of adolescent's screen exposure, and the field is reliant on poor-quality self-report data. This study aimed to examine adolescent's screen exposure by categorising the type and context of behaviours using automated wearable cameras. **Methods.** Adolescents (mean age=15.4 years, SD=1.6 years; n=10) wore a camera for 3 school evenings and 1 weekend day. The camera captured an image every 10 seconds. Fieldwork was completed between February and March 2020, and data were analysed in August 2020. Images were date and time stamped, and coded for screen type, content, and social and environmental context. A subset of images (10%) was repeat coded by a second researcher, and interrater reliability was tested using the Krippendorf (α) statistic. The frequency and percentage of images were calculated for each screen-based device for each annotation group (e.g., location and social interaction). **Results.** The average reliability between the 2 coders across all categories was acceptable (α=0.81). Data representing 71,396 images were analysed. Overall, 74.0% (52,842/71,396) of images contained screens and 16.8% (11,976/71,396) of images contained multiple screens. Most screen exposures involved television sets (36.3%), smartphones (29.2%), and laptop computers (21.4%). The context of screen use differed by device type, although most screen exposures occurred at home (96.3%) and with solitary engagement (83.9%). The immediate afterschool period saw high laptop computer use (30.0%), while smartphone use (38.7%) peaked during pre-bedtime hours. Weekend screen exposure was high, with smartphone use (55.5%) peaking in the early morning period and fluctuating throughout the day. **Conclusions.** This study demonstrated that automated wearable cameras may provide an innovative approach to collect more accurate data on screen-based behaviours, including the context in which they occur. There was evidence for high screen use during the afterschool and weekend period, mostly through solitary engagement, and within the home environment. The findings may inform the basis of larger studies aimed at examining screen exposure in free-living conditions.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Feasibility and acceptability of a mobile health app to promote physical activity in out of school hours care services**

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**Introduction.** The Out of School Hours Care (OSHC) setting provides opportunities for promoting child physical activity. Our research reports on the feasibility and acceptability of an app to promote child physical activity in OSHC services. **Methods.** Using a parallel-group pilot randomised controlled trial design, OSHC services were recruited from within the Illawarra Shoalhaven and South Western Sydney Local Health Districts of New South Wales, Australia. Services in the intervention group accessed the app for 12 weeks between July and October 2022, with access waitlisted for the control group. Feasibility was determined by recruitment and attrition rates. Acceptability was assessed post-intervention via a questionnaire comprising of relevant questions from a previously administered tool. Patterns of app usage were captured via data analytics. **Results.** The app was tested within 15 OSHC services randomly assigned to intervention (n=8) and control (n=7) groups. The app was sent to 34 OSHC educators and directors within the intervention group, and 24 participants (71%) downloaded the app. The most viewed section was physical activity (n=290) (average engagement 4 mins, 6 secs per screen view). The most common activities viewed were those not requiring equipment and not involving an elimination element. Most users (87.5%) allowed push notifications. A 65% increase in app usage was noted on the days push notifications were sent compared to other days. One quarter of users accessed the app on a weekly basis. Nearly two-thirds of participants (n=22) completed the acceptability questionnaire. Eighty-seven percent found the activities useful, 80% reported the app increased their understanding of physical activity within OSHC services and reported use of the app was likely to increase their promotion of physical activity within OSHC settings. Ninety-three percent of users found the app easy to use, trusted the information, and would recommend the app to OSHC educators. **Conclusions.** Our mobile health app intervention demonstrated high feasibility and acceptability, and resulted in increased uptake of physical activity resources within OSHC services included in the trial. Future research will investigate the potential

efficacy of the app.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**What's important to consider when implementing wearable activity trackers into healthcare? A stakeholder Delphi study**

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**Introduction.** Wearable activity trackers provide valuable opportunities to measure and intervene on patient activity in healthcare. Some clinicians and researchers are using wearable activity trackers in healthcare, however, efforts are piecemeal, and many barriers to widespread use persist. This study aimed to develop a consensus-based approach to the quality use of wearable activity trackers in healthcare settings. **Methods.** A four-round Delphi survey was conducted. The Delphi panel (n=58) included healthcare professionals, academics, and health service managers. Round 1 comprised open-response questions that generated items and identified broad themes on the topic. Rounds 2 and 3 used 9-point Likert scales to refine participant's opinions and reach a consensus on the importance or appropriateness of items related to wearable activity tracker use in healthcare (including metrics, device characteristics, clinical populations, clinical settings, and software). Results from Rounds 1-3 were incorporated into a draft checklist to guide clinicians and service planner's in developing procedures for using wearable activity trackers. Round 4 presented the draft checklist to participants, and invited them to rate the usefulness and clarity of checklist items using 9-point Likert scales, and provide feedback using open-response questions. **Results.** Participation rates for rounds 1 to 4 were 76%, 74%, 74% and 66% respectively. Forty-one items were rated as 'critically important' or 'highly appropriate' for using wearable activity trackers in healthcare settings. This included three metrics (step count, minutes of physical activity and sedentary time), 10 device characteristics (e.g. easy to charge, comfortable, waterproof, simple data access), and seven software characteristics (e.g. remote and wireless data access, access to multiple patient's data). The checklist included 12 core elements for using wearable activity trackers in healthcare, which were all rated as useful, clear and appropriate in Round 4. **Conclusions.** We identified important elements for wearable activity tracker use across different healthcare settings. The user checklist developed may support the implementation of wearable activity tracker use in clinical practice. Further work with key stakeholders will evaluate the utility of this checklist in implementing wearable activity trackers into practice.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**A technology-supported physical education course to increase the physical activity levels of university students: Results from a randomised controlled trial**

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**Introduction.** Despite the numerous benefits of physical activity on health and well-being, such as improving physical fitness, mental health, stress reduction, and academic performance, university students are frequently observed to have low levels of physical activity. The purpose of this study is to assess the effectiveness of a technology-supported physical education (PE) course for university students in enhancing physical activity (PA) levels, motivation, and knowledge. **Methods.** A two-arm parallel, randomized controlled trial was conducted with 163 undergraduate students enrolled in an elective unit of study. The intervention group (n=77) received a 16-week PE course incorporating a prototype learning management system (PESSPA) and a mobile app (PESAPA), while the control group (n=86) received the same course without technology. The primary outcome is the difference in students' physical activity levels, motivation, and knowledge at post-intervention, compared with the control group. The outcomes were assessed using valid and reliable tools. **Results.** Negative small to medium intervention effect sizes were found for vigorous-intensity PA (d=-0.34) and total PA (d=-0.26), indicating that the technology-supported course slowed the decrease in self-reported PA levels. Sub-group analysis suggested that students who actively engaged with PESSPA and PESAPA had statistically significant increases in PA knowledge scores (P=0.017). **Conclusions.** Overall, this study found that a course-based intervention incorporating a specifically designed prototype technology effectively slowed down the decrease in self-reported PA among university students.
**Conflict of Interest.** Authors declare that they have no conflict of interests.

# Older Adults I

### Trajectories of physical activity and physical function among older women: data from the Australian Longitudinal study on Women's Health

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**Introduction.** At the population level, physical activity (PA) levels in women decline after the age of 70. There may however be considerable individual differences in the rate of this decline, and in overall PA trajectories, at this life-stage. Our aims were to identify PA trajectories in women aged 73-90 and to examine changes in physical function (PF) in each trajectory group. **Methods.** We analysed data from the 1921-26 cohort of the Australian Longitudinal Study on Women's Health. Individuals who responded to at least two surveys were included in the analyses (N = 8,401). PA and PF were assessed at three-year intervals from 1999 (age 73-78) to 2011 (age 85-90), using validated measures. Group-based trajectory modelling was used to identify PA trajectories, and changes in PF for each trajectory group were estimated with linear mixed-effects model. The age at which each group reached the disability threshold (defined as the average PF score at the time of first report of requiring help with daily activities) was also assessed. **Results.** Three PA trajectories were identified: Low (41.5% of participants), Moderate (49.8%), and High (8.7%). In the Low group median PA was 0 at each survey, while in the Moderate group it decreased gradually from 700 MET.min/week at age 73 to 67 MET.min/week at age 90. In the High group, PA remained <1500 MET.min/week from age 73 to 82, then declined markedly, but remained above 500 MET.min/week until age 90. Average annual decline in PF score in each group was similar (Low, 2.32; Moderate, 2.48; High, 2.20). At age 73, median PF in the Low group was already below the disability threshold. The ages of reaching the disability threshold in the Moderate and High groups were 77-78 and 83-84 respectively. **Conclusions.** We identified three distinct trajectories of PA from age 73, characterised by (1) consistently very low PA (2) a gradual decline from meeting guidelines, and (3) remarkably high PA from age 73 to 80, followed by gradual decline. The three trajectories were characterised by different starting PF scores, but PF declined at a similar rate in all three groups.
**Conflict of Interest.** No conflict of interest.

### Goldilocks days: Optimising time-use for older adults

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**Introduction.** As people age, their time demands change due to factors such as retirement, bereavement, babysitting responsibilities, increasing frailty and new interests. How older people allocate time among their daily activities may have important ramifications on their health. This study aimed to use novel compositional methods to determine optimal daily time allocations to physical activity, sedentary time and sleep for health and wellbeing among Australian older adults. **Methods.** Cross-sectional, n=402 adults (65y (SD=3), 69% female). 24-hour composition of moderate-to-vigorous physical activity (MVPA), light physical activity (LPA), sedentary time and sleep was from 7-day, 24-h accelerometry. Outcomes: BMI from measured height and weight, blood pressure from sphygmomanometry, processing speed from CANTAB tests, depression from CES-D, and self-rated health from EQ-5D. Compositional optimisation models based on robust linear regression were used to determine the best daily durations of MVPA, LPA, sedentary time and sleep. **Results.** The average 24-h composition was (min/d) MVPA=78; LPA=174; sedentary time=677 and sleep=510. The composition was significantly associated with all five outcomes (effect sizes: F=1.4 to 10.1, p=0.02 to <0.001). Relative to the average composition, optimal durations (min/d) of MVPA were higher for all measures, ranging from +37 to +139. Optimal durations of LPA were higher for BMI (+90), similar for blood pressure (+4) and lower for the remaining measures (range -35 to -87). For sedentary time, optimal durations were higher for depression (+80) but lower for all other measures (range -58 to -198). Optimal durations for sleep were higher for processing speed (+64) and blood pressure (+62), similar for self-health (-7) and lower for BMI (-95) and depression (-82). Taking all five outcomes into equal consideration, the overall 'Goldilocks' composition had higher MVPA (+112) than the average, and lower LPA (-29 min/d), sedentary time (-75 min/d) and sleep (-6 min/d). **Conclusions.** How older people use their time has diverse and important impacts on health and wellbeing. Modelled optimal durations of MVPA are consistently high across health domains and may be unachievable for many older adults. Compromises may be necessary and will likely be subject to an individual's constraints, preferences and values.

**Perceptions of using micro bouts of vigorous-intensity lifestyle physical activity to increase physical activity in adults transitioning to retirement**

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**Introduction.** Novel ways to promote physical activity (PA) are needed to provide more opportunities for retiring adults to be active. The primary purpose of this study was to seek retiring adults and health professional's perceptions of promoting PA engagement through micro bouts of vigorous-intensity lifestyle PA. **Methods.** This qualitative study involved thirty adults transitioning to retirement (participants) and ten health professionals. In stage one, participants were asked to wear an Actigraph GT9X on their wrist (7 days) and then attend a 1hr focus group. The focus group's semi-structured questionnaire was based on an expansive literature review and discussions were prompted by each participant's accelerometer findings. In stage two, ten health professionals were recruited based on their experience promoting PA in retiring adults. Each health professional participated in a 1hr semi-structured interview. Interview questions were based on findings from stage one. All focus groups and interviews were voice-recorded and transcribed. Content analysis was performed within NVivo. **Results.** Three focus groups were conducted in stage one. The participants perceived barriers to engaging in micro bouts of vigorous-intensity lifestyle PA were related to deteriorating physical health and chronic health conditions, lack of knowledge of micro-bouts of physical activity, negative environmental conditions, lack of social support, fear of injury, self-perceived lack of time, and negative emotions towards vigorous-intensity PA. Participants perceived facilitators were related to increasing knowledge of micro-bouts of PA, monitoring and tracking of activities, increasing social support, avoiding declining health, maintaining physical health to do things they enjoy, and rewarding achievements. In stage two, health professionals perceived micro bouts of PA as feasible and as an attractive easier alternative to encourage sedentary retiring adults to engage in PA, compared to structured exercises. Health professionals emphasised the need for education on the accumulation of PA, providing goal setting and intervention support for participants, and rewards and motivation for ongoing engagement in PA. **Conclusions.** Retiring adults and health professionals perceived micro bouts of vigorous-intensity PA as a feasible way to increase PA engagement. Personalised interventions are needed to enable retiring adults to identify new opportunities and participate in micro bouts of vigorous-intensity lifestyle PA.

**Exercise in disguise: Developing and maintaining engagement in dance for healthy ageing and fall prevention**

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**Introduction.** RIPE (Really Is Possible for Everyone) Dance provides tailored dance programs for older people with a focus on fall prevention and wellbeing. Program content is informed by the Otago and FAME Exercise Programmes and caters for differing functional abilities. RIPE Dance is popular and has a high level of sustained attendance. This study aimed to understand engagement with these classes and identify what is working and why. **Methods.** A mixed-methods study was conducted, consisting of: (i) a self-report survey of 77 registered participants, measuring attendance, impressions of the class, and self-reported impact on falls, other measures of balance, quality of life, and wellbeing; and (ii) semi-structured interviews with a purposively sampled subset of 20 participants. Here we present survey data analysed for motivators and barriers to initial and ongoing engagement, and interview data coded to program theories following realist evaluation methods. **Results.** Survey respondents (n=62) most commonly identified the physical benefit of exercise as the reason for their initial attendance at RIPE Dance (28/62), however what motivated participants to dance more generally was the music (31/62) and the pleasure and enjoyment it brought (28/62). Initial barriers to participation were health issues (12/62) and lack of confidence (7/62), however only health issues remained an issue over time. Participants attributed their ongoing engagement and motivation primarily to the high-quality instruction (30/62). Interview data identified mechanisms of engagement which aligned strongly with these findings. In particular: a belief in and/or experience of health benefits; musical reactivity; synchrony; raised spirits; and rapport with the teacher are mechanisms which attracted participants and then sustained their engagement and attendance. **Conclusions.** RIPE Dance for older people is appealing, initially for its associated health benefits, to those who enjoy movement to music. Engagement is maintained through skilled, person-centred teaching which caters for different levels of physical function.
**Conflict of Interest.** Authors G Hewton and J Chenery designed and lead these dance classes. They contributed to research project design and interpretation of results but were removed from the process of data collection and analysis to prevent any coercion or bias. The other authors declare no conflict of interest.

**Impact of light volleyball intervention programme in improving physical attributes of older adults in Hong Kong: Preliminary study**

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**Introduction.** Physical inactivity is prevalent in Hong Kong older adults which the HKSAR government has been proactively promoting active ageing to mitigate the issue. To align with the goal of active ageing, the study examined the impact of participating in the light volleyball (LVB) sport activity on the physical health amongst older adults in Hong Kong. Specifically, this study aimed to examine the effect of a 16-week Light Volleyball (LVB) intervention group, with a Taichi (TC) group in regards of improvement i) in functional fitness and ii) in balance in Chinese older adults aged 65 or above in Hong Kong. **Methods.** Randomized controlled trial (RCT) design was adopted to investigate the effect of LVB intervention in regard to the physical health outcomes of the participants. A total of 276 participants aged 60 or above were recruited and randomly assigned to three groups: LVB intervention, active control (TC), and control group. Both participants of LVB group and TC group were enrolled in a 16-week training class with two 90-min sessions per week after pre-test. Measures including Senior Fitness Test Manual and the Balance System SD (BBS-SD, 950-441 model) were utilized to measure their functional fitness and balance control. One-way ANOVA was used to evaluate baseline differences between the groups. **Results.** The results of the fitness component teste were recorded before and after the programme. Participants from LVB intervention demonstrated significant improvement in lower body strength, agility and dynamic balance when compared to TC active control group and control group. However, insignificant results were found for aerobic endurance and upper body strength from LVB group. **Conclusions.** To promote active ageing amongst older adults in Hong Kong, the results of this preliminary study together with the upcoming follow-up tests will provide insight for health specialists and practitioners to choosing LVB community programme given its positive health effect in older adults.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

# Inequities & Rural

**The efficacy and feasibility of the 'Up Your Game' intervention with adolescents living in rural south-east Queensland**

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**Introduction.** A qualitative study was conducted to explore adolescent's preferences for a physical activity (PA) intervention. These participants report that Adolescents attending school indicated they preferred interventions that were sport-based, linked to a community organisation, occurred during the school term and after school hours. The aim of the study was to evaluate the efficacy and feasibility of the Up Your Game intervention on PA, mental health and connectedness in school going adolescents. **Methods.** A pre-post trial was conducted in Dalby, Queensland. Participants were recruited via existing networks. All participants were grouped to the intervention group. The intervention occurred once a week for 1 hour for 10 weeks (45min Volleyball or touch football and 15min of food and social engagement). The primary outcome was PA (measured by ActiGraph GT3X). Accelerometers were worn for 7 consecutive days and Fredson cut points were used to calculate moderate and vigorous PA. Secondary outcomes were body composition (sex-specific BMI z-scores), cardiovascular fitness (20m multistage fitness test), mental health (Revised Children's Anxiety and Depression Scale), and social connectedness (social connectedness scale). Outcomes were assessed at baseline and 10 weeks. Feasibility outcomes included retention, compliance, adherence fidelity and satisfaction. Independent sample T-test were conducted. **Results.** Participants (N= 23, 16% female) were a cohort of students aged 13.4 (±1.5 years). At 10-week follow-up PA did not show improvement. Students improved 20-meter shuttle run (mean=4.3 ± 2.2 - 4.6 ± 2.4,

p=0.616). Mental health improvement was demonstrated in social phobia (mean=46.04 ± 10.4 - 44.72 ±10.0, p=0.695), separation anxiety (mean=55.30 ± 11.0 - 53.56 ± 11.5, p=0.774), generalised anxiety (mean=47.13 ± 9.0 - 46.94 ± 11.5, p=0.286), and obsessive-compulsive tests (mean=49.22 ± 9.6 - 46.83 ± 10.2, p=0.681), however none reached significance. Participants attended 90% of sessions with 74% retention. Participants reported on average to agree with enjoying the program. **Conclusions.** The preliminary results of terms 1 and 2 demonstrate most rural living adolescents were already meeting PA guidelines. The trial is ongoing, however, the intervention program appeared to be feasible and effective.
**Conflict of Interest.** Funding support from Queensland Government and Health and Wellbeing Queensland through ActiveKIT Round 2.

**Individual and socioeconomic factors influencing physical activity among adults living in rural and regional Victoria: A multilevel analysis**

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**Introduction.** Insufficient physical activity is a leading risk factor for non-communicable diseases and has a negative effect on quality-of-life, morbidity and mortality. Physical activity is a multifactorial behaviour, determined by both individual and environmental characteristics. Multilevel approaches permit the simultaneous consideration of the relative influences of individual and socioeconomic factors on physical activity. Using a multilevel approach, we examined the relationship between individual and socioeconomic factors and physical activity among adults living in rural and regional Victoria, Australia. **Methods.** The sample was derived from the 2019 Active Living Census cross-sectional survey, comprising 15,988 adults (<18 years) living in the Loddon Campaspe region of Victoria, Australia. Physical activity was measured using a combination of time in vigorous physical activity and number of muscle-strengthening sessions per week. Individuals were categorised as active or insufficiently active and multilevel statistical analyses were used including individual (age, gender, education, BMI, financial situation) and socioeconomic-level (area of socioeconomic disadvantage, rurality) variables. **Results.** The average age was 53±17 years. The self-reported data indicated that 39% of respondents were insufficiently active. Respondents who were obese (OR: 1.2, 95%CI: 1.1 to 1.4), current smokers (OR: 1.3, 95%CI: 1.1 to 1.7) and had below bachelor level of education (OR: 1.4, 95%CI: 1.2 to 1.6) were more likely to report insufficient physical activity compared to those were of a healthy weight, non-smoker and had bachelor level of education or higher. After adjusting for individual level variables, individuals living in areas of lower socioeconomic disadvantage had decreased odds of being insufficiently physically active (OR: 0.7, 95%CI: 0.6 to 0.9) compared to those living in areas with the most socioeconomic disadvantage. No differences were observed for rurality. **Conclusions.** Both individual and socioeconomic level factors are associated with insufficient physical activity. The multilevel analysis indicates that neighbourhood socioeconomic status potentially influences individuals' physical activity over and above individual factors including self-reported financial situation. This has potential implications for targeting prevention efforts and suggests that to improve physical activity in rural areas, people and places should be targeted simultaneously.
**Conflict of Interest.** The authors declare that they have no conflict of interest.

**Emergence of socioeconomic inequalities in physical activity across the lifespan in women: 21 years of data from the Australian Longitudinal Study of Women's Health**

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**Introduction.** To date, research on the socioeconomic determinants of physical activity has primarily relied on cross-sectional data. Little is known about how or when socioeconomic inequalities in physical activity among women emerge across the lifespan, and how they change over time. Thus, the aim of this study was to examine the patterns of socioeconomic inequalities in physical activity among mid-age Australian women over a period of 21 years. **Methods.** Data from 7,104 participants in the Australian Longitudinal Study on Women's Health (born in 1946-1951) were analysed. Physical activity was self-reported every three years from 1998 (age 47-52) to 2019 (age 68-73). Data from participants who responded to at least 7 out of 8 surveys were included in the analyses. Time/age changes in the proportion of participants who met the physical activity guidelines over 21 years were analysed according to the highest qualification reported at the baseline survey, as a proxy of socioeconomic position. **Results.** In 1998, 57% of the total sample met the guidelines, with no marked differences according to education attainment [relative difference between women with no

formal education and those with higher education: 1.07; 95%CI: 0.99-1.17]. Overall prevalence increased to 65% in 2016, falling back to 59% in 2019. However, among women with no formal education, there was no significant change in the proportion of participants who met the guidelines, while there was an increase among those with higher education (from 55% in 1998 to 74% in 2016, and 68% in 2019). By 2019, the relative difference between the low and high education groups had increased to 1.39 (95%CI: 1.28-1.51). **Conclusions.** Prevalence of meeting physical activity guidelines increased markedly from age 50 to 70 in women with higher education. Still, they remained stable in women with no formal education, suggesting that educational attainment may play a crucial role in shaping physical activity trajectories among mid-age women. The findings suggest that public health policies have not been effective in tackling physical inactivity among disadvantaged groups at this life stage.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Moving in the margins: A qualitative study into the role of physical activity in marginalised communities**

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**Introduction.** Regular physical activity is essential in maintaining health and wellbeing and has been described as human right. However, people in marginalised communities who experience financial insecurity or housing insecurity often face significant barriers to physical activity. In Wellington, the charitable organisation Wellington City Mission works to reduce financial barriers to physical activity by providing clients with passes to facilities such as leisure clubs and swimming pools, or sports equipment. The aim of this study was to investigate the health and well-being outcomes of the clients receiving these physical activity subsidies. Prior to this study, no research has investigated these outcomes in marginalised communities in Aotearoa. **Methods.** Using a qualitative approach, 12 semi-structured one-to-one interviews were conducted with clients of Wellington City Mission. Interview transcript data was analysed using inductive thematic analysis. **Results.** The overarching theme that we identified was that physical activity support resulted in participants actively shaping their health and well-being in four key areas: mental, physical, social, and behavioural health. The results closely align with two established frameworks that describe well-being outcomes: Self-Determination Theory and Te Whare Tapa Whā (Māori Model of Health). Participants reported improvements in their psychological needs of autonomy, competence, and relatedness, which are outlined within Self-Determination Theory. Participants also reported strengthening three of the four pillars of Te Whare Tapa Whā, hinengaro (mental health), tinana (physical health), and whanau (social health). **Conclusions.** This research highlights the significance of physical activity in improving the well-being of people in marginalised communities. Furthermore, it demonstrates the value of the mahi that organisations such as Wellington City Mission do in the community. Our hope is that this research will support ongoing funding towards organisations and initiatives like this, to further improve the social capital, health, and well-being of marginalised people in Aotearoa.
**Conflict of Interest.** The authors declare no conflict of interest.

**Perceptions of physical activity among youth living in rural Queensland**

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**Introduction.** The aim of this study was to explore perceptions, knowledge, attitudes, beliefs, and determinants of physical activity in adolescents living in Dalby, a rural town in southeast Queensland. **Methods.** An advisory group was formed from local Indigenous Elders and stakeholders to advise on cultural appropriateness and local knowledge. The participants were recruited through existing networks and the advisory group. Three focus groups were conducted with youth between the ages of 13 and 17 years. The groups included participants from the Indigenous medical service, the early school leaver industry training program, junior chamber of commerce and snowballed recruitment. All participants lived in Dalby, Queensland (Modified Monash Model 3). Focus group discussions followed a semi structured interview guide and included open ended questions that explored the participants capability, opportunity, and motivations regarding physical activity. Two focus groups were conducted face to face (n= 11 and 7), due to COVID-19 restrictions the third

via videoconference (Zoom) (n=7). Focus group recordings were transcribed verbatim. Coding and thematic analysis was completed using NVIVO. We conducted the analysis in 3 stages: conceptual framework, comparison and contrast and hypothesis development. We used the four-dimensions criteria to assess robustness of the study. **Results.** Saturation of themes was not reached; rather 2 sub-groups were identified, those continuing school (n=16), and early school leavers (n=7). All participants reported the social support from friends as the primary facilitator to physical activity. Other facilitators were school and maintaining a healthy lifestyle. Barriers reported were judgement from peers, interpersonal barriers, and environmental barriers such as access to facilities. Further themes emerged as preferences on intervention design, and preferences on engagement such as social media platforms. **Conclusions.** The study showed rural living early school leaver youth prefer functional training, within walking distance of the town centre, and noted little parent support. Rural living school going youth prefer to participate in organised sport, prefer programs to be linked with a community organisation, and occur during the school term and after school hours.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

# Geography and Active Travel

### Walkability and physical activity in regional setting: A case study linking geospatial and population health data in Tasmania, Australia

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**Introduction.** Regular physical activity (PA) is critical in preventing poor health outcomes, with the built environment influencing PA behaviour. Research has largely focused on urban environments, with little known about regional and rural settings. We sought to 1) assess the feasibility of linking geospatially-mapped walkability data with population health monitoring data, and 2) understand if geospatially-mapped walkability assessments are associated with PA in regional towns of Tasmania, Australia. **Methods.** A walkability index for each of 92 'small rural towns (~6,000 residents)' was calculated, derived from assessments of i) street connectivity, ii) dwelling density and iii) access to daily living destinations. Each index was categorised as high, moderate or low based on tertiles. We used the 2022 Tasmanian Population Health Survey data to calculate means of PA variables (walking duration and frequency, moderate and vigorous physical activity [MVPA] duration and frequency, strength and tone activities, sitting time) for each town. Negative binomial regression analysis determined associations (relative risks, RR and 95% confidence intervals, CI) between the walkability indexes and PA variables ('low' reference group). **Results.** There was no association between any of the walkability indexes and walking (frequency and duration), vigorous PA (frequency), sitting (duration), MVPA (duration), or moderate PA (duration). Moderate street connectivity was associated with duration of strength and tone activity (RR=1.99, 95% CI 1.17-3.40), and with duration of vigorous PA (RR=1.85, 95% CI 1.09-3.17). Moderate dwelling density was associated with duration of strength and tone activity (RR=1.87 95% CI 1.08-3.24). High dwelling density was associated with frequency of moderate PA (RR=0.54, 95% CI 0.35-0.85). High and moderate daily living destinations were associated with duration of strength and tone activity (high: RR=0.58, 95% CI 0.38-0.88; moderate: RR=0.29, 95% CI 0.18-0.49). **Conclusions.** This research demonstrates the feasibility of linking geospatial data with population surveillance survey data in regional Tasmania, but there were few consistent associations between the four geospatially-mapped walkability indexes and the PA variables. The findings highlight the potential of including geospatial data in routine population health monitoring activities, which may assist policymakers to understand the implications of built and landscape design decisions on population health outcomes, especially PA.

### The influence of blue space on physical activity: preliminary findings from an environmental assessment of beaches in the Perth/Peel region in Western Australia

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**Introduction.** Natural outdoor environments such as blue spaces (beaches, rivers, lakes) are important settings for people

to engage in physical activity. The quality and safety of blue spaces can differ across neighbourhoods, with higher socioeconomic status (SES) neighbourhoods having disproportionately better access to natural blue spaces. This study examined the relationship between neighbourhood SES and the features and amenities of beaches in the Perth/Peel region in Western Australia. **Methods.** Beaches in the Perth/Peel region (n=100) were audited using the validated BlueHealth Environmental Assessment Tool (BEAT). The BEAT tool assesses features, amenities and factors (ranging from 0=no provision to 5=excellent provision) that could maximise the health benefits of blue spaces. Activities taking place at the time of the visit, on land and on or in the water, were recorded as well as the assumed age, gender and number of people located at the site. Preliminary analyses examined associations between beach features and activities conducted in and around blue spaces. Further analyses will report how the features of beaches and activities vary by neighbourhood SES. **Results.** Most beaches were located in high SES neighbourhoods (n=55), 17 beaches in medium SES and 28 in low SES neighbourhoods. For beaches located in high SES neighbourhoods the most common observed activities in and around the beaches included walking, cycling, walking the dog, socialising, playing with children and eating and drinking. Beaches with higher quality toilets/changerooms, playgrounds and cafes had more people interacting with the beach, particularly older adults (men and women over 65 years), children (both girls and boys) under 5 years, and women between 20-39 years. **Conclusions.** Preliminary findings suggest the features and amenities in and around beaches impact the types of activities people engage in, including those related to physical activity. The next steps include investigating how the features of beaches vary by neighbourhood SES, and which features are associated with different types of physical activity.
**Conflict of Interest.** PG is a student on the Australian Research Council™ Centre of Excellence for Children and Families over the Life Course (#CE200100025). HC was supported by a National Heart Foundation Future Leader Fellowship (#102549).

**"It's a good start to the day": Urban Australian children's understandings of active mobility and place**

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**Introduction.** Positivist scholarship guided by a socio-ecological perspective has made a significant contribution towards understanding and supporting children's active transport, active play and independent mobility. However, this research has found it difficult to understand the complex pathways by which different factors interact to influence children's mobility. A limited number of studies from a constructivist, embodied and participatory perspective have provided a more nuanced understanding. Research adopting this approach remains scarce. Our study adopted a socially constructivist ontological position to examine how children understand and make sense of their non-motorised local mobility experiences and urban place. **Methods.** We conducted a reflexive thematic analysis of child-led walking tours, semi-structured interviews examining children's multi-sensory mobility experiences, and a range of materials (including photographs, writing and maps) provided by and conducted with 15 children in Grade Five or Six (11-13 years old) in 2019 - 2021. Children were drawn from middle and upper socio-economic advantage areas in Melbourne, Australia. **Results.** Our analysis suggests that dominant urban, Western understandings of mobility and place are often reproduced by school-aged children from urban, Australian backgrounds living in areas of middle- and upper- socio economic advantage. Specifically, children in our study understood mobility as utilitarian, active mobility as healthy, urban mobility as managing risk, and a good neighbourhood as one that is accessible and well maintained. **Conclusions.** These findings may help explain the positive impacts of public health efforts that carry these dominant understandings (e.g. active mobility as being healthy and energetic) amongst children within this population group. While children from similar backgrounds may respond well to policies that carry these understandings, our analysis suggests further embodied and participatory enquiry, particularly amongst lower socio-economic groups, may help better understand and address health inequities.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Incentivising adult public transport use for physical activity gain: Trips4health - a single-blinded randomised controlled trial**

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**Introduction.** Public transport users tend to accumulate more physical activity than non-users; however, whether physical activity is increased through financially incentivising public transport use is unknown. The trips4health study aimed to determine the impact of an incentive-based public transport intervention on physical activity. **Methods.** A single-blinded randomised control trial of a 16-week incentive-based intervention involved Australian adults (18 years) who were infrequent bus users (used bus 2 times/week), split equally into intervention and control groups. Intervention group participants were sent weekly motivational text messages and awarded smartcard bus credit when bus trip targets of increasing volume were met. Both intervention and control group participants received copies of Australian Physical Activity and Sedentary Behaviour Guidelines. The primary outcome of accelerometer-measured steps/day, and secondary outcomes of self-reported transport-related physical activity (walking and cycling for transport) and total physical activity (min/week and MET-min/week, reported via International Physical Activity Questionnaire) were assessed at baseline and follow-up. This trial was registered with the Australian and New Zealand Clinical Trials Registry August 14th, 2019: ACTRN12619001136190. **Results.** Due to the COVID-19 pandemic, the trial was abandoned prior to recruiting the target sample size of 350 participants (N=110) and completing all assessments. Median steps/day declined in both groups, but by less in the intervention group (-557.9 steps [-7.9%] vs.-1018.3 steps/week [-13.8%]). Among intervention group participants, transport-related physical activity increased (80.0 min/week [133.3%]; 264.0 MET-min/week [133.3%]) while total physical activity levels saw little change (35.0 min/week [5.5%]; 25.5 MET-min/week [1.0%]). Control group transport-related physical activity decreased (-20.0 min/week [-27.6%]; -41.3 MET-min/week [-17.3%]), but total physical activity increased (260.0 min/week [54.5%]; 734.3 MET-min/week [37.4%]). **Conclusions.** This single-blinded randomised control trial demonstrated evidence that financial incentive-based intervention to increase public transport use is effective in increasing transport-related physical activity, but not total physical activity. These results warrant future examination of physical activity incentives programs in a fully powered study with longer-term follow-up.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Differential roles of population density in walking and cycling: Findings from Greater Tokyo**

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**Introduction.** Active travel (walking, cycling) confers important health benefits. Although population density is a key factor associated with active travel, existing studies have employed a restricted range of density values, which makes it difficult to identify how the broad range of population density is related to walking and cycling. This study examined the associations of population density with adults' walking and cycling using travel-survey data collected from diverse areas in and around Tokyo. **Methods.** This study used data from the 2008 Greater Tokyo Metropolitan Area Household Travel Survey. Home-based trips by 537,131 adults aged 20-84 years were used to calculate the prevalence of walking and cycling in 590 transportation planning zones (median size: 27 km2). These zones were categorised into quartiles by population density. Multilevel mixed-effects linear regression models were used to estimate the adjusted mean walking and cycling prevalence for each of these quartiles. All models were adjusted for the zones proportion of older adults, women and workers, accounting for clustering at the municipality level (N=275). **Results.** The median [range] population density in persons/ha was 5.5 [0.2-16.5] for the lowest (Q1), 39.5 [16.8-65.1] for the second (Q2), 90.0 [65.1-120.4] for the third (Q3), and 158.2 [122.2-313.9] for the highest quartile (Q4). The mean adjusted prevalence of walking was 29% (95%CI: 27, 31) for Q1, 48% (47, 50) for Q2, 58% (56, 60) for Q3, and 65% (63, 67) for Q4. The mean adjusted prevalence of cycling was 10% (9, 12) for Q1, 21% (19, 22) for Q2, 23% (21, 24) for Q3, and 21% (19, 22) for Q4. **Conclusions.** The association between population density and walking appeared linear: the higher the density, the higher the prevalence. On the other hand, the prevalence of cycling appeared almost constant for the second, third and highest density quartiles. The findings suggest that cycling may be more independent of population density, compared to walking, and has the potential for engagement even in lower population density areas in the context of greater Tokyo.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

**Identifying cycling behaviour in healthy adults using thigh-worn accelerometry and activity classification algorithms**

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**Introduction.** Cycling is associated with reduced mortality and morbidity. Moreover, an increasing number of health promotion efforts aim to increase cycling as part of active commuting. Accurate methods to identify cycling are crucial to advance our understanding of associated health benefits and overall cycling behaviour. Thigh-worn accelerometers can be used to objectively determine the duration and frequency of basic physical activity types performed over several days. Previous research suggests that the classification accuracy of free-living cycling remains challenging, but no study has yet evaluated differences between available algorithms. In this study, we compare two classification algorithms for thigh-worn accelerometer data regarding their accuracy in correctly classifying cycling. **Methods.** 35 healthy adults (51% female, age = 30.1± 9.0 years, BMI = 23.6± 3.1 kg/m²) were equipped with a SENS motion triaxial accelerometer (12.5 Hz with ± 4g) attached to the lateral thigh. Participants performed a standardised 3x3-minute laboratory protocol on a cycling ergometer with varying intensities, followed by 60 minutes of unrestricted free-living activities with a video camera mounted to the chest. Time-synchronised videos were used to annotate the start and end of cycling. Raw accelerometer data was processed using the SENS motion web-application and ActiPASS Version 1.58. **Results.** ActiPASS and SENS motion algorithms both achieved a balanced accuracy of 0.96 for cycling under laboratory conditions. A total of 297 minutes of cycling was annotated for the free-living condition. ActiPASS achieved a balanced accuracy of 0.90 (sensitivity = 0.82; specificity = 0.99) for free-living cycling while SENS motion achieved a balanced accuracy of 0.80 (sensitivity = 0.59; specificity = 1.00). Post-processing of the free-living SENS motion classification using a moving majority voting algorithm improved the balanced accuracy to 0.86 and sensitivity to 0.72. **Conclusions.** Researchers may use thigh-worn accelerometers and existing algorithms to objectively identify free-living cycling behaviour with high accuracy. The ActiPASS classification algorithm performed more accurate than the SENS motion algorithm. Post-processing techniques such as filtering can potentially improve the classification sensitivity and contribute to more accurate classifications.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Joint associations of neighbourhood walkability and greenery with walking among middle-aged and older adults**

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**Introduction.** Promoting walking is key to addressing the burden of physical inactivity. Higher levels of walking are individually associated with greater walkability and more greenery in neighbourhoods. It is unclear whether they interact to influence walking. We examined the joint associations of neighbourhood walkability and greenery with residents walking. **Methods.** This cross-sectional analysis used data from the AusDiab3 study, collected in 2011/12 (3,032 urban participants; 56% women; mean age 60 years). Walking (including both for transportation and recreation) was assessed in min/week, and defined using two binary measures: 1) engagement in any walking, and 2) engagement in150 min/week walking. Walkability (index derived from dwelling density, intersection density, and destination density) and greenery (area of dense vegetation, characterised by NDVI < 0.6) were calculated within a 1-km buffer around participants' homes. Participants were grouped by walkability tertiles (low/medium/high) and then by greenery tertiles (low/medium/high) within each walkability tertile. Two-level logistic regression models were used to assess associations. **Results.** Of the study participants, 85% engaged in some walking, and 43% engaged in walking 150+ mins/week. There was a moderate negative correlation between walkability and greenery (r= -0.5). The median amount of dense vegetation was 1.4, 0.5, and 0.1 km$^2$ in low, medium and high levels of walkability, respectively. Residing in high walkability, high greenery neighbourhoods was associated with greater odds of any walking (OR=2.05, p=0.003) and 150 min/week walking (OR=1.49, p=0.021), compared to living in low walkability, low greenery neighbourhoods. Additionally, in low walkability neighbourhoods, relative to low greenery, medium (OR=1.60, p=0.058) and high (OR=1.53, p=0.087) greenery were marginally associated with greater odds of any walking. Also, in medium walkability neighbourhoods, compared to low greenery, higher greenery was marginally associated with greater odds of 150 min/week walking (OR=1.39, p=0.088). **Conclusions.** These findings emphasise the importance of creating walkable neighbourhoods with more greenery to promote walking. While improving walkability would require extensive structural modifications, incorporating greenery could potentially be a more feasible approach to promote walking, particularly in low and medium walkability settings.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Walking outdoors and picking up litter to prevent plastic pollution: Does it motivate people to be more active?**

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**Introduction.** In many countries, people have started to pick up litter when walking in outdoor areas to prevent plastic pollution on land, in waterways and in oceans. However, no studies have yet investigated such litter walking as an emerging physical activity behaviour. This study examined associations between litter walking frequency and physical activity motivation in adults. **Methods.** The Litter Walker Survey was a cross-sectional study using an anonymous online survey conducted in 2021/2022 at Central Queensland University, Rockhampton, Australia. Targeted participants were Australian adults aged 18+ years who pick up litter when walking outdoors. Litter walking frequency was assessed using a single item: Do you regularly pick up litter when walking outdoors (or running/jogging, hiking, playing outdoors with children)? Responses were grouped into regularly (1-3 times per week) and occasionally (1-2 times per month). Further, participants were asked: Has picking up litter outdoors motivated you to become more physically active (e.g., walking, running/jogging, or playing outdoors with children more often)? Response options were yes/no. Binary logistic regression analyses were conducted to examine associations between litter walking frequency and physical activity motivation, with adjustment for age, sex, education, employment status, relationship status, parental status, urbanisation and household income. **Results.** A convenient sample of 547 participants (mean age: 51 years, 86% female, 87% high education, 94% Caucasian) completed the survey. Of these, 81% were regular litter walkers and 20% reported that picking up litter outdoors has motivated them to become more physically active. Compared to occasional litter walkers, regular litter walkers more likely reported that picking up litter outdoors has motivated them to become more physically active (OR = 3.13, 95% CI: 1.38 - 7.10, p = 0.006). **Conclusions.** The findings show that regular litter walking is positively associated with physical activity motivation in adults. This warrants further investigation of whether regular litter walking is also associated with higher physical activity levels, and whether interventions to promote litter walking could increase physical activity.

# 24-Hr Movement

### Wear-time compliance with a 24-hour accelerometry protocol: insights from the international study of movement behaviours in the early years (SUNRISE)

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**Introduction.** Ensuring high compliance with measurement protocol is crucial for effective population surveillance. This study aimed to determine wear-time compliance with a 24-hour waist-worn accelerometry protocol for assessing movement behaviours and to identify the associated variables in a geographically and economically diverse international sample of preschoolers. **Methods.** Data from 24 countries in the pilot phase of the SUNRISE study (2018-2023) were analysed. Each country had a minimum sample of 50 children recruited from urban and rural settings. The analytical sample consisted of children (n=2791; mean age=4.3 years) who participated in the 5-day, 24-hour waist-worn accelerometry protocol and provided useable data for wear-time compliance analysis. Raw accelerometer data were processed using the GGIR package in R. Children's compliance was evaluated using two wear-time criteria (>16 and <20 hours/day). Descriptive statistics were calculated for the overall sample and separately by child socio-demographics (sex, age, residential settings, and caregiver education levels) and country-level (country income levels and geographical regions) characteristics. Mixed-effects logistic regression models were used to determine the associations between child- and country-level characteristics and wear-time compliance. **Results.** The proportions of children providing at least three days of data meeting the wear-time criteria of 16 and 20 hours were 70.6% and 63.9%, respectively. Regardless of wear-time criteria, compliance was generally lower among girls (63-70%), younger children (<4 years) (61-68%), those living in urban areas (61-69%), and those whose caregivers had a high education level (59-68%). Children from high-income countries (44-53%) and the European region (51-56%) demonstrated lower wear-time compliance than those from lower-income countries and other regions. No significant associations were found between wear-time compliance and the assessed characteristics. **Conclusions.** This study revealed moderate compliance with the 24-hour waist-worn accelerometry protocol among a global sample of preschoolers. The choice of wear-time criteria resulted in varying compliance rates across population subgroups. Future research should focus on developing strategies to maximise wear-time compliance, which would help to reduce measurement bias and enhance the validity of accelerometer estimates of movement behaviours.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Associations between postnatal pollution exposures, 24-hour movement behaviours and motor development outcomes among children (0-12 years old): A systematic review

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**Introduction.** Exposure to pollution during the early stages of life can significantly impact children's short- and long-term developmental trajectories. Existing literature has examined associations between young children's 24-hour movement behaviours (physical activity, sleep, and sedentary behaviour), motor development and health outcomes. Studies have also established associations between prenatal pollution exposures and developmental vulnerabilities in children. However, associations with postnatal pollution exposure remain largely unknown. **Methods.** We searched eight electronic databases; CINAL, EMBASE, ERIC, Global Health, MEDLINE, PsycINFO, Scopus, Web of Science, from inception to May 2023. Studies that reported an association between a pollution measure (air, water, noise, or land) and at least; one 24-hour movement behaviour (physical activity, sleep, sedentary time, screen-time) or motor development outcome (fine or gross motor) among children from birth to twelve years were included. **Results**: The search returned 5358 studies, of which 18 were eligible for inclusion. Most studies were conducted in high-income countries (n=13). Studies reported measures of outdoor air (n=7), indoor air (n=4), land (n=3) and noise pollution (n=4). Most studies reported associations between a pollution measure and motor development outcomes (n=13), followed by sleep (n=4) and physical activity and sedentary behaviour (n=1). **Conclusions.** There is limited evidence regarding associations between pollution measures, 24-hour movement behaviours and motor development. Findings from the review were mixed and inconsistent. Future research should consider post-natal exposure to different types of pollution and its impact on healthy levels of 24-hour movement behaviours and motor development as well as considering cofounders as such as geographic location, weather conditions and country-income level.

**24-hour movement behaviour typologies and adiposity in children and adolescents: Identifying "bee-like behaviours" using a bias-adjusted latent profile analysis**

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**Introduction**. This study investigates 24-hour movement behaviours (MB) typologies in children and adolescents and their associations with adiposity indicators. **Methods.** This cross-sectional study involved 374 children (aged 8-13 years) and 317 adolescents (aged 14-18 years) from the Czech Republic who participated in a 24-hour MB assessment using wrist-worn accelerometers for seven consecutive days. The time spent in sedentary time (ST), light physical activity (LPA), moderate-to-vigorous physical activity (MVPA), and sleep were derived from raw acceleration. Adiposity indicators included objectively measured body mass index, from which z-score (BMIz) was calculated, fat mass percentage (FM%), fat mass index (FMI), and visceral adipose tissue (VAT). The study employed a three-step latent profile analysis to identify MB typologies derived from 24-hour time-use data and their associations with adiposity indicators. The models were adjusted for potential confounding factors. **Results.** We identified two MB typologies in children and three in adolescents. The typologies were labelled to reflect the behavioural profiles of bees. In children, the typologies were Workers, characterised by high levels of MVPA and LPA, and Queens, characterised by low levels of MVPA and LPA and high levels of ST. Among adolescents, an additional typology included Drones, characterised by moderate levels of MVPA, LPA and ST. Sleep duration was similar across all identified typologies. When controlled for covariates, children belonging to Workers were associated with lower FM% by 3.2 %, lower FMI by 0.9 units, and lower VAT by 15.7 cm2 compared to Queens. There was no association with BMIz amongst children. No significant associations were observed between identified typologies and indicators of adiposity in adolescents. **Conclusions.** Our study highlights the importance of promoting active lifestyles in children to potentially reduce adiposity. These findings can provide insights for interventions aimed at promoting healthy movement behaviours and preventing childhood obesity.
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**Adherence to 24-h activity guidelines among New Zealand adolescents: A sociodemographic analysis**

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**Introduction**. During adolescence, the balance of 24-h time-use (physical activity, sedentary behaviour, sleep) is important for health, as emphasised in the New Zealand (NZ) 24-h activity guidelines for youth. However, the extent of adherence to these guidelines among NZ adolescents remains poorly understood. The purpose of this study was to evaluate adherence to the NZ 24-h activity guidelines in a sample of NZ adolescents, and compare adherence rates across sociodemographic subgroups. **Methods.** A total of 226 healthy 12-17 year-olds (49% female) from Auckland, NZ participated in the study. Adherence to the 24-hour activity guidelines was assessed against 7 criteria: moderate-to-vigorous physical activity (MVPA)1h/day, recreational screentime 2h/day, age-recommended sleep duration, vigorous physical activity (VPA) 3 days/week, bone and muscle-strengthening activity 3 days/week, light physical activity (LPA) 2h/day, and consistent bed/wake-times (range <1h). Adherence rates were compared by age-group (12-14y, 15-17y), gender, ethnicity and area deprivation (NZdep2018). Time-use behaviours were measured using ActivPAL accelerometers over 7 consecutive days. Daily self-reported data on sleep times, screen usage, bone/muscle-strengthening activity and VPA were collected using a diary. **Results.** Out of 211 participants with valid accelerometer data (93%), 0.9% concurrently met the three key guidelines (MVPA, screentime, sleep) and 0.5% adhered to all 7 criteria. Adherence rates were 2.4% for MVPA, 13.3% for screentime, 43.1% for sleep, 36.0% for VPA, 29.9% for bone/muscle-strengthening activity, 15.6% for LPA and 4.7% for consistent bed/wake-times. Younger adolescents were more likely than older adolescents to meet guidelines for screen-time (p=.001, V=0.25) and LPA (p=.001, V=0.21), while males exhibited greater adherence than females for LPA (p=.032, V=0.14), bone/muscle-strengthening (p=.013, V=0.16), and VPA (p=.015, V=0.16), based on chi-squared tests with Cramer's V. There were no differences in adherence rates by ethnicity or area deprivation (all p=.05). **Conclusions.** Overall, NZ adolescents do not comply with national 24-h activity guidelines. Action is needed to bridge the gap between current behaviour patterns and the recommended healthy balance of 24-h behaviours.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work. Supported by Maurice and Phyllis Paykel Trust and Lottery Health Research grants.

**Adherence to WHO 24-hour movement behaviour guidelines and association with socio-demographic factors among Ethiopian preschool children**

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**Introduction.** The World Health Organisation has called for more evidence on 24-hour movement behaviours and adherence to guidelines from low- and middle-income countries. We examined data collection protocol feasibility, the proportion of Ethiopian preschool children (3.0-4.9 years) who met the individual and overall guidelines, and socio-demographic differences in guideline adherence. **Methods.** A cross-sectional study was conducted among 430 Ethiopian preschool children from Adama (urban) and Lume Woreda (rural). Physical activity and sleep were measured using hip-mounted ActiGraph accelerometers and data were reduced using age-specific cut-points and algorithms, respectively. Sedentary behaviour (screen time) and socio-demographic factors were parent-reported. The feasibility of the study protocol was examined using focus groups with parents/guardians. Data were analysed in the R version 4.2.2 software and thematic analysis for the focus group. Multivariate logistic regression models tested associations between meeting the guidelines and socio-demographic factors (child sex, place of residence and parent educational level). **Results.** More than half of children (58.0%) met the overall guidelines. A higher proportion met the physical activity (96.1%) and sleep guidelines (91.9%) compared to the sedentary behaviour guideline (63.5%). Children who lived in rural areas were more likely to meet the sleep (98.6% vs 83.8%, AOR= 8.60; 95%CI: 3.55, 23.73), sedentary behaviour (84.6% vs 38.2%, AOR= 7.31; 95%CI: 3.93, 14.02) and overall (81.3% vs 30.1%, AOR= 7.41; 95%CI: 4.04, 13.97) guidelines than those who lived in urban areas. The study protocol was feasible in Ethiopia with minor modifications. **Conclusions.** A high proportion of Ethiopian preschool children met the guidelines. Our study suggests that interventions focused on screen time and urban areas are needed. As the study protocol was deemed to be feasible, further research with a nationally representative sample should be conducted to determine the population prevalence of guideline adherence across Ethiopia**.**
**Conflict of Interest.** The authors declared no relevant conflict of interest in relation to this work.

**Physical activity, screen time and dietary behaviours in New Zealand adolescents prior to versus during COVID-19 pandemic**

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**Introduction.** Insufficient physical activity (PA), high screen time (ST), unhealthy dietary patterns and clustering of these behaviours among adolescents in developed countries were reported prior to the COVID-19 pandemic restrictions. These health behaviours may have further worsened during the pandemic, but data from many countries are lacking. This study examined PA, ST and dietary behaviours in New Zealand adolescents 5-6 years prior to [Study 1 (S1)] and during [Study 2 (S2)] the COVID-19 pandemic. **Methods.** Adolescents from all 12 secondary schools in Dunedin, New Zealand, participated in the Built Environment and Active Transport to School (BEATS) studies in 2014/2015 (S1; n=1,266; 15.3±1.4 years; 55% female) and 2021/2022 (S2; n=819; 15.2±1.4 years; 47% female). Participants self-reported PA, outside school ST (TV/computer/video games), and dietary behaviours in an online survey. Proportions of adolescents meeting guidelines for PA (60 minutes of moderate-to-vigorous PA/day), ST (<2 hours/day) and fruit and vegetable (F&V) intake (<1 serving/day for both F&V) were calculated. Data were analysed using multivariable linear and logistic regression modelling. **Results.** At both time points, a low proportion of adolescents met health behaviour guidelines. Compared to S1, a higher proportion of adolescents at S2 met guidelines for PA (17% vs 23%; p=0.001) and ST (13% vs. 18%; p=0.001), while no significant difference was observed for F&V intake (30% vs. 27%; p=0.322). Average daily ST outside school at S2 was comparatively lower than S1 on weekend days (6.9±3.5 vs. 6.1±3.6 hours/day; p=0.001), but higher on weekdays (5.0±2.9 vs. 5.6±2.9; p=0.001). Higher weekly intake of sweets and lower weekly intake of sugary soft drinks and fast food were also reported at S2 versus S1. **Conclusions.** During the pandemic period, participating adolescents reported higher levels of PA, weekday ST and consumption of sweets, and lower weekend ST and consumption of sugary soft drinks compared to pre-pandemic period. Despite some improvements observed during the study period, our study reinforces the need for continued public health actions to improve lifestyle behaviours amongst adolescents.
**Conflict of Interest.** Sandra Mandic works at AGILE Research Ltd. (www.agileresearch.nz) and Wellington City Council (New Zealand). Other authors have no conflict of interest.

**Understanding adolescent 24-h time use: Age and gender disparities in New Zealand's youth**

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**Introduction.** Attaining a healthy balance of daily movement, rest and sleep is crucial for adolescent health. However, current understanding of 24-h time-use during this developmental stage remains limited. Moreover, there is a paucity of research analysing posture and movement to clearly differentiate between sedentary behaviour, standing, and active behaviour among adolescents. This study aims to address these gaps by investigating time-use patterns in New Zealand adolescents, by age and gender. **Methods.** A total of 211 healthy adolescents (12-17y, 49.3% female) from Auckland, NZ, participated in the study. The ActivPAL accelerometer was used to assess 24-h time-use over seven consecutive days. Self-reported sleep times were also collected. Time-use was grouped into four categories: sleep, sedentary (sitting/lying), standing, and active (stepping/cycling). Compositional multivariate analysis of variance was conducted to compare the proportions of time spent in these behaviours between age groups and genders. Between-group differences in compositional means and their bootstrapped 95% confidence intervals (CI) were calculated. **Results.** Adolescents spent on average 8.8h sleeping, 10.6h sedentary, 2.8h standing and 1.9h active (compositional means). Time-use differed between younger (12-14y) and older (15-17y) adolescents ($p<.001$, $\eta p^2 = 0.20$), and between males and females ($p<.001$, $\eta p^2 = 0.27$). Younger adolescents spent more time sleeping (+44 min, 95%CI [29,59]) and being active (+12 min [2,22]), while spending less time sedentary (-33 min [-6,-59]) and standing (-23 min [-5,-40]), compared to older adolescents. Males were more active (+11 min [1,21]) but also more sedentary (+47 min [20,70]) than females, while spending less time standing (-41 min [-26,-56]) and sleeping (-17 min [-1,-32]). **Conclusions.** This study highlights disparities in the proportions of time spent sleeping, sedentary, standing and active among New Zealand adolescents based on age and gender, emphasizing the need for tailored interventions to promote healthy 24-h time-use. The findings underscore the need for robust posture and movement data analysis to better understand the associations between 24-h time-use and health outcomes during this pivotal life-stage.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work. Supported by Maurice and Phyllis Paykel Trust and Lottery Health Research grants.

# New Directions in Physical Activity

## Potential efficacy of the MOVERS professional development program: A pilot randomised controlled trial

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**Introduction.** Physical activity interventions in early childhood education and care (ECEC) settings have used a variety of approaches yet have reported mixed results. To date, few interventions have focused on the quality of the movement environment. High-quality ECEC settings are known to be positively associated with child outcomes, and studies have shown that the quality of the ECEC environment can be improved through educator professional development (PD). The purpose of this study was to examine the potential efficacy of an educator PD program with the movement environment and physical activity as primary outcomes. **Methods.** The MOVERS PD program was a 6-month pilot RCT involving 5 ECEC centres and 157 children. Centres were randomised to either the intervention (3 centres) or the wait-list control group (2 centres). Changes in the ECEC movement environment were assessed at six months using the MOVERS scale. Changes in children's gross motor skills (TGMD-2), physical activity (GT3X accelerometers), fine motor skills (ASQ-3), receptive vocabulary (PPVT-4) and numeracy (PENS) were also assessed. Data were analysed using linear mixed models (SPSS, Version 26) and effect sizes were calculated. Process data relating to the PD were collected using questionnaires. **Results.** At six months, there were positive changes in the quality of the ECEC movement environment in the intervention group compared to the control group. Children in the intervention group had significantly higher scores for fine motor skills (small effect, Phi= 0.21) and gross motor skills (effect size medium-large, 0.68 - 1.23). No differences between groups were observed for PA. Educators suggested that the PD content was relevant and clearly explained, highlighting that the hands-on nature of the sessions was the most positive aspect of the sessions. **Conclusions.** The MOVERS PD program is potentially efficacious; changes in educators' pedagogy resulted in changes in children's outcomes. Given the dearth of educator PD in this area, this PD has the potential to impact children's outcomes. It is a novel approach focusing on quality and educator-child interactions in improving children's outcomes.
**Conflict of Interest.** The authors declare no relevant conflict of interest. No financial interest or benefit has arisen from this research.

## Associations between excessive and problematic social media use and psychosomatic complaints among adolescents: Does physical activity moderate the associations?

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**Introduction.** Social media is an essential part of everyday life; however, prolonged engagement in social media can affect mental well-being in children and adolescents. The aim of this study was to assess associations between excessive and problematic social media use (SMU) and selected health complaints in adolescents and whether physical activity (PA) moderates these associations. **Methods.** We analysed data from 209,441 adolescents aged 11-15 years (51.2% girls) from 40 European and North American countries that participated in the 2017/2018 Health Behaviour in School-aged Children (HBSC) survey. Excessive SMU was assessed by using the time spent on social media, whereas problematic SMU was defined by symptoms of addiction to social media. PA was dichotomised as meeting the guidelines of 60-mins/day of moderate-to-vigorous PA. The eight-item HBSC symptom checklist was used to assess psychosomatic complaints and then dichotomised as high or low. Multilevel mixed-effects logistic regression was used to estimate the associations, adjusted for a set of covariates. **Results.** High psychosomatic complaints were more common among girls than boys (43.5% vs 29.3%). Multivariable modelling showed that adolescents who reported both excessive and problematic SMU had 4.1 times higher odds in girls (OR: 4.12; 95% CI: 3.78-4.49) and 2.9 times higher odds in boys (OR: 2.88; 2.43-3.16) of reporting high psychosomatic complaints. Girls with problematic SMU had 3.4 times higher odds of high complaints (OR: 3.37; 3.07-3.71) and with excessive SMU had 1.4 times higher odds of high complaints (OR: 1.40; 1.37-1.47). Boys with problematic SMU had 2.7 times higher odds (OR: 2.70; 2.46-2.96) and with excessive SMU had 1.4 times higher odds (OR: 1.38; 1.33-1.44) of reporting high complaints. Being physically active did not moderate the associations of excessive and problematic SMU with psychosomatic complaints. **Conclusions.** Our multi-country analyses showed that excessive and/or problematic SMU were associated with high psychosomatic complaints across gender with adverse effects being higher for problematic SMU than excessive SMU, and these associations were

not moderated by PA. Prospective research with objective measures is needed to understand potential causal mechanisms of these relationships.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### UC30 - Co-designed behavioural nudges to reduce university students' sedentary time: A pilot pre-post study

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**Introduction.** Prolonged, uninterrupted sedentary behaviour has serious health consequences, including increased risk of death from any cause. University students are highly sedentary and are at substantial risk of associated health consequences. Reducing sedentary time through frequent movement breaks has been shown to have positive effects on health and offers learning benefits such as improved concentration and memory. There is currently limited evidence of effective interventions to reduce sedentary time in university students. The UC30 project aimed to create and evaluate a co-designed, behavioural nudge-based intervention to reduce university students' self-reported sedentary behaviour by one hour per day through frequent breaks during prolonged sitting. **Methods.** Experience-based co-design methodology was used to create the UC30 intervention to meet stakeholder needs (university staff and students) using gain-framed messaging and guided by choice architecture principles. A pilot pre-post study investigated the effect of this intervention in a physiotherapy student cohort (n=60). The primary outcome measure was self-reported sedentary time (Past-day Adults' Sedentary Time-University questionnaire). Device measured (ActiGraph GT3X accelerometer) sedentary time was collected in a sub-group of participants. Responses were matched for pre-post analysis, which used paired-t tests and Wilcoxon-signed ranks tests to determine intervention effects. **Results.** Co-design resulted in quick production of high-quality resources which staff were willing to implement, and students believed would be effective. Mean self-reported sedentary time per day was 10.94 hours (SD 2.10 hours) at baseline and mean accelerometer sedentary time was 9.18 hours (SD 1.02 hours) per day. Device and self-report measured sedentary time were moderately correlated pre- and post-intervention (r=0.5-0.6). Post-intervention there was no significant reduction to total sedentary time (p=0.93), however, there was a 51-minute reduction (95%CI: -121, 19) in sitting-for-study. Sitting for transport (p=0.05) and sitting for socialising increased post-intervention (p=0.05). **Conclusions.** This appears to be the first project to utilise co-design to create a behavioural nudge-based sedentary behaviour intervention for university students. Results indicate the intervention may be effective in reducing sedentary time during study, indicating a larger trial is warranted.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Is time really a barrier to regular participation in physical activity, or just an excuse?

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**Introduction.** Time is the most common barrier to physical activity participation, yet time-use studies show people have sufficient discretionary time to dedicate to being active. Arguably, lack of time is a 'perceived' barrier and the more substantive issue is where time is prioritised and why. Perhaps physical activity does not offer the same positive reinforcement, or value as competing activities, or other social and environmental factors are of influence. This study answers the call for greater analysis into why time is reported as a barrier to being active (Biddle, 2022) and explores why people choose to use their discretionary time in particular ways. **Methods.** A qualitative method was employed. Eleven participants (7 men) aged between 26 and 31, with an intention to be active but reported a lack of time as a barrier, participated in a face-to-face semi-structured interview. Interview topics centred around available discretionary time, how discretionary time was spent and why time was allocated to those specific activities. Data were analysed inductively using thematic analysis (Clarke & Braun, 2021). **Results.** Participants had 2-4 hrs of discretionary time available per day, and despite reporting that being active was important, this time was predominately spent on screen-based activities, hobbies, socialising, or napping. Participants chose to allocate their time to activities, 1) based on their mood and cognitive state at the point of decision (feeling lazy, tired), 2) that resulted in desirable immediate outcomes (improved mental health, completion of life tasks or connecting with others) and 3) that had become habitual. Physical activity was not prioritised because when time was available, participants preferred low-effort activities, associated being active with negative outcomes, lacked motivation and confidence, and perceived they had uncontrollable barriers. **Conclusions.** Lack of time may be the excuse for why people are inactive, but sedentary behaviours are providing the immediate positive outcomes desired in discretionary time and a mindset shift with respect to the value of physical activity and greater

cognitive control over time (planning, breaking habits) is required to remove this barrier.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Mats, music, and moments of interruption: The role of sensory engagements in yoga**

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**Introduction.** This research is one part of a PhD project that seeks to understand how ancient yogic concept "withdrawal of the senses" manifests as wellbeing in contemporary yoga. I ask the question; how do sensory engagements contribute to yogic wellbeing in multi-use spaces? I draw upon feminist new materialism as a conceptual frame to highlight the significance of non-human elements in sense perception and wellbeing. **Methods.** Auto/ethnographic observations and interviews are used to explore how aesthetic features of multi-use space weave together people, places, and things. This is an on-going project, thus reported findings are based on interviews with seven yoga practitioners, and 6-months of field work in one recreation centre and multiple yoga studios. Fieldnotes and interviews have been analysed using thematic clustering around key themes; touch, vision, sound, and smell. **Results.** The aesthetic features of spaces hold significance for how people connect with yoga practice. Sight, sound, and touch are deeply considered by yoga teachers who attempt to curate an environment for wellbeing. Sensory engagements through yoga mats, music, and scenic views enable people to withdraw from a chaotic external world and into a "yogic headspace." Yet, this state of wellbeing is interrupted by the appearance and sounds of multi-use spaces that are external to the practice of yoga. **Conclusions.** Sense withdrawal is challenged by the spaces of contemporary yoga practice. Visual and auditory experiences both engage and interrupt yoga practice, holding potential implications for on-going practice. The aesthetic expectations of space contribute to the accessibility of yogic wellbeing for diverse bodies in shared spaces. Attending to the sounds, props, and appearance of multi-use spaces may enhance participation with yoga and promote deeper experiences of wellbeing.
**Conflict of Interest.** The researcher is a yoga teacher in one of the spaces where participants were recruited. Organizational and individual consent considered this relationship and was approved through the University Human Ethics Committee.

**Retention, engagement, and allied healthcare costs during a 'stepped down' physical activity program for military service veterans: The Active Choices pilot study.**

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**Introduction.** We have shown that Active Choices, a "stepped-down" 12-week physical activity (PA) support program for military service veterans (MSVs) is effective at maintaining self-managed moderate-to-vigorous PA following supervised PA treatment. With a view to informing larger future trials, this study assessed retention of MSVs in the program, the types and frequencies of activities chosen, and the costs of allied healthcare services accessed during the intervention period. **Methods.** Participants were 34 Australian MSVs (mean [SD] age = 61 [15.8] years) who were completing supervised referral to an exercise physiologist or physiotherapist. MSVs stepped-down to Active Choices and received four in-person consultations over 12 weeks (2020-21). Research records collected at consultations were used to assess program retention rate and PA choices, with drop-out classified as non-attendance at a scheduled consultation and no response to follow-up contact by the research team. For allied healthcare service utilisation costs, de-identified individual-level data were accessed on participant use of government-funded exercise physiology and physiotherapy treatment services from baseline to Week 12, with these data compared to normative costs for the same demographic. **Results.** Of the 34 participants recruited into the study, 29 (86%) completed the Active Choices program. Twenty-four different PA choices were selected by participants. Water-based activities were the most popular (14 from 24 choices; 41%), followed by walking and fitness classes (13 from 24 choices; 38%), with chosen activities tending to be group-based rather than individual. The average total cost of the exercise physiology and physiotherapist services used by participants during the study was $60.51 AUD/week, which was lower than the typical/client costs calculated for the same government funded treatment services and demographic in 2020 ($97.05 AUD/week). **Conclusions.** The findings highlight the potential of Active Choices to retain and engage MSVs in the transition from supervised to self-managed PA. Preliminary evidence also suggests that the program reduced allied healthcare service utilisation costs, with implications for ongoing referral costs if impact is replicated at scale.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Intergenerational effects of preconception and prenatal parental physical activity on the brain development of offspring: A scoping review**

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**Introduction.** Maternal preconception and prenatal health behaviours impact offspring brain development and lifelong mental health. Accumulating evidence in preclinical models suggests physical activity (PA) has intergenerational effects on brain health and development. That is, parental PA levels both preconception and during pregnancy impact offspring brain health. The extent of evidence of these effects in humans is unknown. This scoping review compiles the human literature in this area, identifies knowledge gaps, and makes recommendations for future research. **Methods.** We systematically searched five electronic databases for studies conducted in humans and published in English from database inception to 9th December 2021. Experimental or observational studies were included that reported data on (a) parental PA exposure preconception (fathers and mothers) or prenatally (mothers only) and (b) offspring brain development. Two reviewers independently screened studies according to predetermined inclusion criteria. Data from included studies were extracted by one reviewer and verified by a second. **Results.** Fourteen studies were included (four experimental, 10 observational) reporting on 93,486 parent-child dyads (100% maternal, 0% paternal). All studies that examined preconception and prenatal maternal PA (3/3) and eight of 11 studies that examined prenatal maternal PA only found positive relationships with offspring brain development. Maternal PA was positively related to offspring brain development as neonates (2/2 studies), infants (5/7 studies) and young adults (1/1 studies). Most studies in early childhood (3/4) did not find associations between maternal PA and offspring brain development, whereas the results of studies in late childhood (2/2) were mixed. Irrespective of timing of maternal PA or offspring age, while all 10 observational studies (n=92,595 mother-child dyads) found positive relationships between maternal PA and offspring brain development, most experimental studies (3/4, n=891 mother-child dyads) found no effect. **Conclusions.** Little is known about the intergenerational effects of parental PA on offspring brain development in humans, particularly paternal preconception PA. Emerging evidence is promising but more experimental studies with longer offspring follow-up and more objective and/or mechanistic assessments are required, as most existing evidence is based on subjective measures.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**The development and evaluation of netball specific high-intensity interval training sessions: The Netball-HIIT study**

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**Introduction.** High-intensity interval training (HIIT) is a popular and time-efficient form of exercise demonstrating capacity to enhance a range of health outcomes (including physical fitness, cognition, cardiovascular disease biomarkers, and mental health) in varied population and settings. Embedding HIIT into sport training sessions represents a novel approach for increasing the dose of vigorous physical activity that sport participants receive during training. The purpose of this two-phase study was to design, develop and evaluate netball specific HIIT sessions (Netball-HIIT) for use with netballers of varied ages and ability. **Methods.** In Phase 1 (March-July 2020) a systematic analysis of netball GPS data (N=30 netball players) and gameplay video footage (10-hours) was conducted; followed by the design and testing of five 8-min Netball-HIIT sessions with a convenience sample of 100 netball players (mean age 21±8.44yrs) from NSW Australia. In Phase 2 (May-June 2021) the feasibility and preliminary efficacy of delivering one Netball-HIIT session each week for five weeks was assessed using a two-armed randomised controlled feasibility study. Phase 2 participants were 30 netball players (born in 2010) randomly allocated to two dose-matched netball specific programs (n=15 Netball HIIT or n= 15 Netball Knee Program: NKP). Physiological (cardiorespiratory and muscular fitness) and psychological (HIIT self-efficacy and affect) outcomes were assessed at baseline and 6-weeks. Data were analysed using linear mixed-models and Cohen's d effect sizes. **Results.** Netball-HIIT sessions were highly rated by players, and higher average (139bpm) and peak heart rates (156bpm) were detected amongst participants in Netball-HIIT (KNP=127bpm and 152bpm). We observed a large positive effect for cardiorespiratory fitness [+2.4 laps, d=0.89]; and small-medium effect resulted for muscular fitness [push-ups +1.2, d=0.49; standing jump +0.8cm, d=0.36] in favour of Netball-HIIT. **Conclusions.** Our findings suggest that a coach-led Netball-HIIT may provide a time-efficient and effective training component for use in netball.
**Conflict of Interest.** there are no perceived financial or any conflicts of interest of any of the authors related to the research study.

# Scale Up & Translation

### How and if to scale-up a physical activity intervention: A case study of Play Active

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**Introduction.** There is little empirical guidance on "how" to scale-up, and how this can inform "if" to scale up a physical activity intervention. Play Active is a childcare physical activity intervention co-designed with childcare, play, public health and government sector partners. Play Active has been proposed for scale-up across multiple Australian states. Given the absence of publications describing the scale-up process (i.e., the "how") and the results of a scalability assessment (i.e., the "if"), the aims of this presentation are twofold: (i) to describe the scale-up process and (ii) to outline the results of a scalability assessment. **Methods.** The four iterative steps of the PRACTical planning for Implementation and Scale-up (PRACTIS) guided the scale-up process. Decisions about adaptations were guided by the Model for Adaptation Design and Impact (MADI). The scalability assessment used the Intervention Scalability Assessment Tool (ISAT) and was completed by authors involved in scale-up (MM, AN, EA, HC), as well as partners from the play, government, and public health sectors. **Results.** The scale-up process involved (i) characterizing the parameters of the implementation setting (all long daycare services across Western Australia, Queensland, and South Australia; n=2965); (ii) maintaining and identifying new partners to inform the scale-up process; (iii) identifying barriers and facilitators to implementation; and (iv) addressing barriers through adaptations. Results of the scalability assessment revealed domains with the highest scores (<2.5/3), the problem, intervention, and reach and acceptability. Four more domains scored highly (<2/3), including fidelity and adaptation, delivery settings and workforce, implementation infrastructure, and strategic/political context. The lowest scores (<2/3) were the evidence of effectiveness, intervention costs and benefits, and sustainability domains. **Conclusions.** This theory-informed scale-up process and scalability assessment resulted in a proposed physical activity intervention (Play Active) deemed suitable for scale-up. The scalability assessment revealed gaps and challenges in certain scalability domains, which can be addressed through further research and adaptation. The proposed scale-up trial evaluation will be crucial to support decision-makers to fund, scale and institutionalize Play Active in the real world.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Evaluating a national physical activity initiative to get more Australians moving: Heart Foundation Walking

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**Purpose.** Heart Foundation Walking (HFW) is a population-based physical activity intervention. The volunteer-led group program has provided Australian adults with opportunities to walk in a safe, supportive and social environment. Commencing in 1995, the program was scaled up and has run nationally since 2007. With online individual Personal Walking Plans introduced in 2021, the HFW has reached over 250,000 walkers nationally. **Project Description.** The HFW received funding from the Australian Government Department of Health and Aged Care's Healthy Heart Initiative from 2018-2022. The Heart Foundation recruited an independent external reviewer to gain insights from participants and stakeholders on the effectiveness of the program over the 5-year funding period. The mixed-method evaluation focused on the awareness and reach of the program, participant experience, program outcomes for engagement in walking, physical activity education, and attitudes amongst participants and stakeholders towards walking. Participant experience was very positive with walkers and Walk Organisers rating their experience high (9.5/10 and 9/10 respectively). Participation and retention rates were also high (89% at 12 months) especially for women, and surpassed targets for registered participants, volunteer Walk Organisers and walking group Host Organisations. There was a high level of

awareness of the Heart Foundation, engagement with the program and social media platforms. Host Organisations interviewed reported that the program was aligned with their values to support more people to be active. Walkers highlighted that participation enhanced their knowledge of the benefits of walking and positively impacted their physical, social and mental wellbeing. The social dynamic of walking groups was highly valued for increasing motivation, meeting new people and feeling engaged. **Conclusions.** The evaluation provided evidence for the effectiveness of the HFW in achieving its objectives, and recommendations for improvements. Recommendations included an increased focus on raising awareness of the program, communicating the benefits of walking and offering options for individual exercise tracking and incentives for ongoing participation to increase engagement. Although participation numbers exceeded targets, further improvements were also recommended to engage people from indigenous, low income and culturally and linguistically diverse communities.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Tū Manawa Active Aotearoa: Evaluation of a needs-based activation fund to promote physical activity in local communities

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**Purpose.** Tū Manawa Active Aotearoa Fund (Tū Manawa) is a needs-based fund managed by Regional Sports Trusts (RSTs). Sport NZ allocates $16 million annually to support projects in communities aimed at improving play, active recreation, and sport (PARS) opportunities for tamariki and rangatahi across Aotearoa New Zealand (NZ). **Project Description**. Tū Manawa was developed as an activation fund to directly cover the costs of delivering and supporting PARS opportunities in local communities. It provided resources to successful applicants to help address barriers to PARS participation that included: venue hire; transport to events; equipment, support for volunteers/officials/staff; and other delivery costs. There is a particular focus on using evidence to demonstrate local needs and applying innovative approaches to facilitate strengths-based engagement of low-participation groups. Logic models were developed to guide implementation and evaluation. A five-criteria Value for Money (VfM) framework was also used to support evaluative judgments. A mixed methods approach to evaluation included RST interviews (n=18), case studies of Tū Manawa projects (n=20), community studies (n=3) and analysis of project reports from nine RSTs (n=96). We also reviewed administrative data for approved applications (n=3,310) and pending/declined applications (n=2,481). After two years, there is evidence of better and more accessible opportunities. This includes PARS with stronger cultural connections, increased accessibility for those with disabilities, and reduced barriers in other low-participation groups. Case and community studies provide examples of how Tū Manawa projects led to outcomes ranging from increased cultural connection to improved physical literacy. **Conclusions.** The variation in PARS opportunities across regions highlights the need for a locally-led approach to projects. The use of evidence in the application process enabled better investment both in terms of project content and target population. At a national level, there is clear evidence for the benefits of engaging RSTs to coordinate nuanced community-led delivery in their local regions.
**Conflict of Interest.** EM, RW, and NS are Sport NZ employees actively evaluating and promoting PARS policy and practice in NZ. TR and HG are contracted by Sport NZ to evaluate the delivery and impact of Tū Manawa.

## Geography & Active Transport

### Spatial patterns of physical activity among Auckland adults experiencing urban regeneration: Preliminary findings from Te Hotonga Hapori

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**Introduction.** Combining accelerometers and GPS to measure physical activity context is important. However, converting these data into usable metrics can be complex and time-consuming. The purpose of this presentation is to demonstrate an automated data processing pipeline for both merging GPS/accelerometer data and summarising these data into meaningful metrics across different contexts. **Methods.** Data collection is currently ongoing until late 2024; results from the first 100 adults (18-84 years) across four suburbs in Tāmaki Makaurau will be presented. Each participant wore an accelerometer (Axivity AX3) and a GPS (QStarz BT-Q1000XT) for 7 days. Data were merged using the HABITUS

software, before being summarised using the PALMSplusR package. This package allows researchers to summarize these data within different spatial (within a particular area) and temporal (during a particular time of day) domains, and isolate specific transportation behaviours (such as commuting to and from work). **Results.** Data were summarized across five different domains: home, work, transportation, greenspace, and other. Preliminary results suggest that the time spent within each domain, and the intensity of physical activity within each domain varied. Most higher-intensity physical activity was achieved in the transportation domain. This domain encompasses a combination of walking, cycling, and vehicle trips, the patterns of which varied across the different neighbourhoods. **Conclusions.** Processing accelerometer and GPS data is traditionally complex and time-consuming, but new automated tools like HABITUS and PALMSplusR make this work much more straightforward and feasible. Summarising these data across different contextual domains can provide greater insight into the nuances of human behaviour and increase the precision and sensitivity of physical activity measures. This is particularly useful in studies such as Te Hotonga Hapori, where the relationship between urban regeneration and physical activity behaviour can be accurately studied.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Moving from simple to complex: Creating a systems map to address obesity in the Darling Downs region**

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**Introduction.** The prevalence of overweight and obesity is approximately 20% higher in the Darling Downs region, compared to the state and national averages. Sustained and equitable reductions in obesity are unlikely to be achieved through simple, linear causal models. Consequently, systems-based approaches are required to address obesity. The aim of this study was to pilot the use of systems mapping as a tool to develop a multi-sectorial approach and strategy to address the complex issue of obesity in the Darling Downs region. **Methods.** Stakeholders were recruited via emails using existing networks and snow-ball sampling. Online workshops (n=5) were conducted using Miro software. After a brief introduction, participants were asked to post sticky notes reflecting their perceptions of the determinants of obesity in the Darling Downs. This was followed by a short discussion where they provided more insight into the determinants listed. Next, participants drew connection circles illustrating links between determinants. Finally, they rated the top 3 factors associated with obesity and identified factors that could play a role in addressing them in the region. Kumo software was used to develop the collated systems map. **Results.** Twenty-nine participants from diverse sectors attended the workshops. The main themes that emerged included poor nutrition habits and knowledge, lack of supportive environments for physical activity, and costs associated with better food choices and physical activity. Being time-poor was associated with less healthy lifestyle choices and participants noted that extended family support and networks could assist with improving these behaviours. Local and State governments were consistently identified as actors that should play a role in addressing various determinants. Furthermore, the importance of local organisations such as community groups, sports clubs, schools, the media and local businesses were highlighted. All the determinants and the causal links between them were collated to create a systems map. **Conclusions.** The systems map generated illustrates some of the potential actions that can be implemented by various organisations, addressing the determinants of obesity in the region. The next phase of this research will include community members in similar workshops, after which priority actions will be identified for implementation.

**Are disadvantaged areas more dependent on cars for daily travel?**

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**Introduction.** Health behaviours, such as physical activity, are known to be socially patterned and play a role in socioeconomic inequalities in health. Although studies have examined how active travel (walking/cycling) is distributed across society, little research has investigated the socioeconomic distribution of sedentary travel (car use). Understanding how advantaged and disadvantaged areas differ in these behaviours may inform transport and planning initiatives to tackle health inequalities. We examined associations of neighbourhood-level socioeconomic status (SES) with sedentary travel and with active travel, using Australian travel survey data. **Methods.** This cross-sectional study used data from 41,097 participants (18+ years, travelled on the survey day) of the 2012-18 Victorian Integrated Survey of Travel and Activity, which collected 24-hour travel diary data in Melbourne and surrounding regional cities. Participants were considered "car dependent" if they reported only car use without walking/cycling. We also examined those who walked/cycled without using cars (active travel). For SES, we used the Index of Relative Socioeconomic Disadvantage (IRSD) at the level of suburbs (N=483). Multi-level logistic regression examined the odds of car dependency and active travel, adjusting for individual demographic variables (age, gender, work status, household composition, income, car ownership) and suburb characteristics (population density, distance from the nearest city centre). **Results.** More than two thirds (68%) of participants were car dependent, while only 8% engaged in active travel. One SD greater IRSD (higher SES) was associated with 21% lower odds (95%CI: 0.74, 0.83) of being car dependent after adjusting for individual demographic variables. This association remained highly significant (OR=0.84, 95%CI: 0.80, 0.87) after further adjusting for suburb characteristics. For active travel, one SD greater IRSD was associated with 20% (95%CI: 1.11, 1.30) higher odds of being active in travel, but this was attenuated after adjusting for suburb characteristics (OR=1.07, 95%CI: 1.01, 1.14). **Conclusions.** We found car dependency to be more prevalent among those who live in disadvantaged areas than those living in advantaged areas. Our findings suggest that transport initiatives addressing car dependency in disadvantaged areas may help to reduce socioeconomic inequalities in health.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

# Exercise Physiology I

### Investigating the feasibility of a supervised, personalised exercise programme, during the first 12-months of primary treatment, for people with cancer

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**Introduction.** Extensive evidence exists supporting the benefits of exercise on ameliorating treatment-related side effects, improving wellbeing and quality of life in people undergoing cancer treatment and people living with and beyond cancer. Furthermore, emerging research in prehabilitation indicates that exercise may lead to improved surgical and medical outcomes in people with cancer. Despite this growing body of evidence, exercise programmes are not provided to people undergoing cancer treatment at Christchurch Hospital. This study aimed to explore the feasibility of introducing a 12-week individualised exercise programme, developed, and supervised by an accredited exercise physiologist, to individuals with early-stage breast or colon cancer in Christchurch, New Zealand. **Methods.** This multimethod study assessed the feasibility of a 12-week supervised exercise intervention for people with early-stage breast or colon cancer (n=29). The voices of participants were expressed through a qualitative content analysis of participants' feedback and field diary notes. A pragmatic approach allowed for adaptions to the real-world environment, and to provide a proposal for an on-going person-centred exercise programme in Christchurch. Feasibility was evaluated through process feasibility (recruitment, compliance, and adherence) and scientific feasibility (safety, description of dose response, and acceptability). Measures of functional capacities and person-reported outcomes were collected to provide an overview of the response to the intervention and guide the exercise prescription. **Results.** Process feasibility was established through a recruitment rate of 45%, a compliance rate of 79%, and an adherence rate of 89%. Scientific feasibility was established through the reporting of no serious adverse events, and a description of the dose and response that aligned the American College of Sport Medicine's guidelines. Furthermore, acceptability of the programme was presented through the qualitative content analysis on participants response to a feedback survey (n=21) and field diary notes. **Conclusions.** This study provided feasibility for a 12-week exercise physiology-led intervention for people with early-stage breast and colorectal cancer in Christchurch, New Zealand. A proposed interdisciplinary community-based exercise programme has been outlined and would provide continued support, psychological, and physical health benefits for people with cancer.
**Conflict of Interest**. The authors declare no relevant conflict of interest in relation to this work.

# Workplaces

### Recommendations by teachers for the design of lifestyle interventions for promoting teachers' health and wellbeing in Australia: A thematic analysis

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**Introduction.** Interventions targeting physical activity, healthy eating, and sleep improve mental wellbeing. Teachers in New South Wales (NSW), Australia, need support to improve their mental wellbeing and health-promoting behaviours. This formative research explored the potential for accessible and practical lifestyle interventions among NSW teachers to understand their need for support and to identify important intervention features. **Methods.** Current NSW teachers employed at primary or secondary schools were invited to participate in an online interview between September and December 2022. A semi-structured interview guide was developed containing questions designed to elicit open responses with accompanying prompts and probes. Reflexive thematic analysis was used to interpret data and develop insights. **Results.** Twenty-three teachers (17 women and 6 men) participated, representing a range of teaching experience (1-32 years). Teachers recognised that physical activity was beneficial for managing stress and mood as well as improving their energy levels at work. However, systematic issues around workload, staff shortages, and the school environment hindered teachers' engagement in physical activity and other health behaviours and created challenges for at-school health and wellbeing programs. Previous programs for teachers were not perceived as genuine as they lacked sustainability and failed to recognise challenges arising from the inflexible education system, making it challenging for teachers to incorporate suggested activities into their daily practice. Teachers emphasised the importance of social connection, face-to-face workshops, and short, practical activities in future programs. **Conclusions.** Teachers want and need support to improve their health behaviours and wellbeing. Future interventions should incorporate social interaction and include examples of activities that can be incorporated into teachers' busy day. Understanding the school ecosystem is imperative to ensure effectiveness and sustainability of interventions. Previous attempts at supporting teachers' health and wellbeing were perceived as lacking authenticity. Future interventions must be co-designed with teachers to gain their buy-in and ensure program relevance. Collaboration will enable interventions to effectively meet the specific needs of teachers, ultimately enhancing their health and overall wellbeing.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### What strategies do desk-based workers use to sit less and move more? Findings from the BeUpstanding national implementation trial

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**Introduction.** Desk-based workers typically sit for the majority of their workday. Much of this sitting time is accrued in prolonged bouts, which is associated with detrimental health outcomes. BeUpstandingTM is a free, 8-week online champion-led program which aims to raise staff awareness of the benefits of sitting less and moving more and build a supportive culture for change. Preliminary findings have demonstrated that the program is effective in reducing workplace sedentary time, including prolonged sedentary time. The aim of this study is to examine the sit less, move more strategies workers used to achieve these behaviour changes. This is the first known study to explore this in a large-scale national implementation trial. **Methods.** Staff participating in the BeUpstanding implementation trial reported on their use (0 [never/rarely] to 4 [always/nearly always]) of 10 sit less and 11 move more strategies, pre and post the 8-week champion-delivered intervention, as well as their work behaviours (% of worktime sitting and moving, and % of sitting in prolonged bouts). Strategy use was compared pre and post intervention and tested in relation to behaviour change using linear mixed models, accounting for clustering and repeated measures. **Results.** Across 1797 staff (mean ± SD age 43.0± 11.4 years, 64% female) from 67 workplaces, mean use (0-4) of strategies overall (0.36 [0.31, 0.41]), and specifically to sit less (0.44 [0.39, 0.49]) and move more (0.28 [0.23, 0.33]), all increased significantly (p=0.05) following intervention. Changes in overall strategy use were associated with significantly greater changes in sitting (-1.37% [-1.90%, -0.84%]), moving (0.44% [0.17%, 0.72%]), and % of sitting in prolonged bouts (-1.26% [-2.12%, -0.40%]) with similar results seen for both sit less and move more strategies. **Conclusions.** Staff significantly increased their usage of strategies to sit less and move more, with greater improvements in strategy use related to enhanced behavioural improvements. To inform

recommendations, further research can explore which strategies resulted in the greatest behaviour changes, as well as determine those with the strongest uptake and use.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Recruitment, retention, fidelity, and costs of a 'stepped-down' high intensity interval training program for truck drivers: The Fit2Drive cluster-controlled trial

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**Introduction.** We have demonstrated the efficacy of Fit2Drive, a "stepped-down" 12-week high-intensity interval (HIIT) program that improved the cardio-respiratory fitness of truck drivers (9.5% increase in VO2peak relative to a control). To inform scalability, this study assessed program recruitment and retention, HIIT fidelity (session attendance and intensity), and outlays (clinical screening and delivery costs). **Methods.** Nine transport companies from Brisbane, Australia were recruited to the study (2020-22). Companies were sequentially assigned as they entered the study to Fit2Drive (four driver clusters; 1x4 minutes supervised to self-managed HIIT, 3 times a week; stationary exercise bike and circuits) or a control (five driver clusters; usual behaviour with fitness and lifestyle counselling post-intervention). Program recruitment and retention rates were calculated for both clusters relative to expressions of interest and baseline entry. HIIT fidelity for Fit2Drive was assessed using logbook data on session attendance (four three-weekly stages with supervision decreasing at each stage) and intensity (target RPE of 16-18 on a scale of 6-20). Intervention outlays (clinical screening and HIIT delivery) were summed, with mean costs determined per driver. **Results.** 120 drivers expressed interest in the study; 44 drivers returned informed consent and entered baseline (all men; mean [SD] age=50.5 [9.8] years; BMI=32.2 [6.7] kg/m2; recruitment rate of 34%). Respective retention rates for Fit2Drive and control clusters were 44% (12/27 drivers) and 65% (11/17 drivers). Program completers attended 70% (25/36) of HIIT sessions (mean [SD] RPE of 16.7 [1.5]); average session attendance declined as the program progressed from HIIT supervision to self-management (Weeks 1-3 [fully supervised] 94% [34/36] of sessions attended vs Weeks 10-12 [fully self-managed] 19% [7/36] of sessions attended). Mean outlays for clinical screening (AUS$250) and HIIT delivery (AUS$460) by medical and fitness teams were costed at AUS$710/driver. **Conclusions.** Restrictions on depot access impacted driver recruitment and retention to the program. For drivers who completed Fit2Drive, the findings highlight relatively low program outlays and good fidelity for achieving vigorous exercise intensity, but also significant challenges for scalability as delivery 'stepped-away' from supervised to self-managed HIIT.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

## Strength & Conditioning I

### Under pressure: The chronic effects of lower-body compression garment use during a 6-week military training course.

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**Introduction.** Previous studies have shown that compression garments may aid recovery from exercise in the acute setting. However, little is known about the long-term use of compression garments for recovery. This study aimed to assess the influence of wearing compression garments (CG) on changes in physical performance, subjective soreness and sleep quality over 6-weeks of military training. **Methods.** 55 officer-trainees aged 24 ± 6 y from the New Zealand Defence Force participated in the current study. In a randomised, counterbalanced, parallel-group design, 27 participants wore CG every evening for 4-6 h, and 28 wore standard military issue attire (CON) over a period of 6-weeks. Subjective questionnaires (soreness and sleep quality) were completed weekly, while 2.4 km run time-trial, maximum press-ups, and curl-ups were tested pre and post 6-weeks of military training. **Results.** A repeated-measures ANOVA indicated no significant group x time interactions for any performance measure ($p$ >0.05). However, there were *small* effects in favour

of CG over CON for improvements in 2.4 km run times (46.8 s vs 28.9 s; *d* =-0.24) and press-ups (5.2 vs 1.5 repetitions; *d* =0.36). Subjective soreness also resulted in no significant group x time interaction but displayed *small* to *moderate* effects for reduced soreness in favour of CG. **Conclusions.** While not statistically significant, compression garments provided *small* to *moderate* benefits to muscle soreness and *small* benefits to aspects of physical performance over an intense 6-week military training regime.
**Conflict of Interest**. The authors declare no relevant conflict of interest in relation to this work.

**Advancing the diagnostic value and the acute and chronic effects of wearable resistance on the pro-agility shuttle**

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**Introduction.** The pro-agility shuttle is a common change of direction (COD) test, however, current utility of total-time is inadequate at detailing phase-specific information. Diagnostic advancement of the pro-agility shuttle may provide improved understanding of phase-specific COD performance. Wearable Resistance (WR) limb-loading can be used to enhance sport-specific movements, yet a dearth of empirical information is available pertaining to the acute and chronic effects of this form of training on COD performance. Therefore, it is imperative to understand the ensuing effects of WR limb-loading strategies on phase-specific COD performance. This information will provide insights into WR forearm and shank limb loading strategies and how these strategies affect different phases and sub-components, providing recognition of a potential new training strategy for improving COD performance. **Methods.** Test-retest reliability (*n*=10) of an advanced diagnostic protocol and measurement of different sub-components (i.e. acceleration and COD phases) within the pro-agility shuttle was established using timing light technology. A randomized cross-over design was implemented to determine the acute effects of WR (*n*=28). Repeated measures experimental design was used to determine the chronic effect of WR training (n=42). **Results.** Comparisons between sessions 2-3 resulted in low typical error (CV $\leq$ 4.42%) and excellent relative consistency (ICC $\geq$ 0.90) for all sub-tests. Acute loading of 1.5% WR shank (WRs) was found to significantly decrease COD1 time (-12.8%, *d*=-0.49, *p*<0.05) and total-time (-10.6%, *d*=-0.90, *p*<0.05), while WR forearm (WRf) significantly increased linear speed time during the ACC2 phase (6.98%, *d*=0.47, *p*<0.05). Chronic training revealed COD-specific WR training over a 6-week period did not result in any significant change to pro-agility total-time. Significant increases in reaccelerative performance (24.11%, *d* = 0.84, *p* = 0.008), and decreases in sprint time (*d* = -0.55 to -0.60) were found following WRs training. Significant decreases in ACC1 time (-8.60%, *d* = 1.39, *p* = 0.037), yet increases in ACC2 time (41.54%, *d* = 0.94, *p* = 0.004) and horizontal jump distance (*d* = -1.12 to 0.090, *p* <0.014) were seen after WRf training. **Conclusions.** It would seem that the components of the pro-agility test can be measured reliably and therefore can provide valuable diagnostic information to the practitioner to guide COD programming. It is recommended that practitioners are cognizant of balancing the positive effects of WR limb-loading on sprint and jump performance with the potential negative impact on COD performance when implementing WR within COD-specific training.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Integrating local vibration training into an isometric strength protocol: Acute effects on lower-body isokinetic strength in healthy, active individuals**

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**Introduction.** This study investigated the acute effect of local vibration on the lower limbs utilizing a Myovolt leg vibration device during an isometric hamstring contraction. The subsequent isokinetic strength and power of the hamstrings and quadriceps muscles were tested once the local vibration stimulus was removed. The investigation into the strength and power of the muscles once the stimulus was removed is a novel concept within the utilisation of local vibration for strength protocols. **Methods.** Recreationally active females (n = 7) and males (n = 9) performed an isokinetic dynamometry strength protocol and then a series of isometric hamstring contractions with local vibration stimulus and then repeated the protocol without the stimulus. The order of this was randomised between participants. Local vibration was applied for ~ 8-12 minutes at a frequency range of 0 to 60 Hz and an amplitude of 0 to 2mm. Peak torque (PT), mean power (MP), angle of peak torque (APT) and time to peak torque (TPT) were measured using the Humac Norm isokinetic dynamometer to assess the pre-and-post-vibration isokinetic strength and power of the hamstrings and quadriceps. **Results.** There were no significant differences found for all measures between and within groups for all variables (p > 0.05). Within conditions changes ranged from – 22% to 5% across all variables. Between conditions changes ranged from -9% to 2% across all variables. **Conclusions.** Acute localised vibration during an isometric hamstring contraction does not affect peak torque, mean power, angle of peak torque and time to peak torque of both the hamstrings and quadriceps.

Further well-designed studies should be utilized in future research to determine the exact protocols to follow when utilizing local vibration alongside different muscular contractions during resistance training.
**Conflict of Interest.** The authors of this work declare the following relevant conflict of interest in relation to this work, Dianne Jones is one of two co-directors of Myovolt as well as one of the student's (Hannah Tiedt, the principal author of this work) supervisors during her master's degree. However, Dianne was excluded from the initial study design, all experimental procedures carried out during the data collection period and was blinded to the initial results of the study; she only became aware of results once they were fully analysed.

**The influence of menstrual cycle phase on kinetic variables and subjective experience of exercise during high-volume bench press cluster sets: A pilot study.**

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**Introduction.** Menstrual cycle (MC) phase has been hypothesized to influence strength-related measures of performance due to fluctuating levels of oestrogen and progesterone. However, inconsistent trends have been reported in the literature and the impact of psychological state or physical symptoms may not be considered. The aims of this research were to 1), investigate the influence of the MC on kinetic variables (peak and mean velocity, percentage velocity loss) during high-volume bench press cluster sets, and 2), investigate the influence of MC phase on subjective experience of exercise. **Methods.** A quasi-experimental design was used, wherein participants (n = 3) performed a bench press one-repetition maximum (1RM) test during the early follicular phase, followed by three experimental sessions across the early follicular phase, mid-follicular phase and mid-luteal phase in a randomized order. The experimental sessions included four sets of 12 repetitions bench press at 60% 1RM, using clusters of four repetitions with 30 seconds of rest between clusters. A linear position transducer (LPT) recorded peak and mean velocity, power and force for the concentric phase of each repetition. Rating of perceived exertion (RPE) was collected for each set, and the subjective exercise experience scale (SEES) was collected prior to and at the conclusion of each session. Kinetic variables and RPE were analysed using a two-way repeated measures ANOVA, SEES was analysed using a one-way repeated measures ANOVA. **Results.** There was no significant difference in peak velocity, mean velocity, percentage mean velocity loss or RPE ($p > 0.05$) between the different MC phases. No significant difference in the aspects of SEES (positive wellbeing, psychological distress, and fatigue) ($p > 0.05$) was observed between the MC phases. **Conclusions.** In conclusion, there was no difference in objective performance or subjective experience of high-volume cluster sets in the bench press exercise across differing MC phases. Based on the limited sample, it appears that resistance trained females may have comparable performances in submaximal high-volume resistance training at different time points in the MC.
**Conflict of Interest**. The authors declare no conflicts of interest associated with this research.

## Sport & Exercise Psychology I

**Influence of pressure on conscious motor processing and performance in 'skill-execution only' and 'dynamic' task contexts in soccer penalty shooting**

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**Introduction.** The Theory of Reinvestment predicts that pressure negatively impacts perceptual-motor skill performance, due to reinvestment of explicit knowledge about how to perform the skills (i.e., 'conscious motor processing'; CMP). A recent systematic review confirmed that performance pressure generally leads to an increase in CMP. However, there was insufficient evidence to conclude that pressure-induced increases in CMP are associated with negative impacts on performance. **Methods.** Fifteen experienced soccer players performed two versions of a penalty-shooting task ('Go-only' vs. 'Stop-and-Go'), which allowed for more, or less, CMP to occur. In both cases, pressure was manipulated by means of an evaluative audience (audience vs. no audience). CMP was assessed with the Movement Specific Reinvestment Scale and by means of a skill-focused dual-task. Measures of performance included penalty shooting accuracy and movement times. **Results.** Analyses indicate that penalty shooting accuracy was lower in the Stop-and-Go than in the Go-only task

context ($p$ = .01). Presence of an audience did not cause participants to experience an increase in competitive anxiety, nor did it show significant impact on CMP or penalty shooting performance. Post-hoc analyses identified trait reinvestment as a significant covariate. High-reinvestors engaged in CMP more throughout the task than low-reinvestors, and unlike low-reinvestors, they showed faster reaction times ($p$ = .01) and greater stopping success (i.e., improved response inhibition) in presence of an audience ($p$ = .04). **Conclusions.** Findings indicate that in general, presence of an audience had no significant effects on CMP or penalty shooting performance. Players who scored high on trait reinvestment, however, exhibited faster reaction times and greater stopping success in the presence of an audience, suggesting that increased monitoring pressure – while not causing significant increases in state anxiety – may facilitate inhibitory performance in those players who go about their skill execution in a deliberate and self-conscious manner. Future studies are required to further assess the mediating role of CMP in soccer penalty shooting under pressure and to examine the impact of CMP and reinvestment across 'execution only' and 'dynamic' task contexts.
**Conflict of Interest**. The authors declare no relevant conflict of interest in relation to this work.

# Indigenous & Pasifika Peoples

### Working together to understand First-Nation Australian children's interpretation of a pictorial questionnaire designed to assess physical literacy

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**Introduction.** The Physical Literacy in Children Questionnaire (PL-C Quest) is the only pictorial tool designed to measure children's physical literacy and is aligned with the Australian Physical Literacy Framework (APLF). The development study of the PL-C Quest only included children from non-Indigenous backgrounds living in a metropolitan city. Hence, the present study aims to determine if Indigenous children living in regional and rural areas i) understand the items (test content) and ii) relate to the items (response processes) as intended by the APLF definitions. **Methods.** We worked in cooperation with John Moriarty Football (JMF) to recruit nine Indigenous children aged 5-12 years from the after-school sessions of the program in a regional town (site 1) and 12 Indigenous children enrolled in the JMF school program in a rural town (site 2). Children were interviewed one on one in site 1 and in in pairs or small groups in site 2. The study used a qualitative descriptive approach. The PL-C Quest depicts an orange cartoon bunny in 30 scenarios with accompanying statements. Each scenario includes images showing a proficient execution of the activity and another showing a developing execution. Children picked the image that represented them more. Cognitive interviews were conducted based on verbal probing using Tourangeau 1984 four-stage cognitive model (comprehension, retrieval, judgment, and response). **Results.** Overall, the children understood most of the content of the items as intended. In addition, they could retrieve relevant information pertaining to their experiences when responding to the items in the PL-C Quest. For example, when responding to the items (items for Object Manipulation and Strength) in the PL-C Quest, one child reflected on their ability to play an Indigenous ball-throwing game, and another recalled the time they carried their younger siblings. Also, most children confidently selected the bunny that represented them in each scenario and could justify their responses. **Conclusions.** The study findings contribute to an argument that interpretations of PL-C Quest data may be valid for making decisions about children's physical literacy in Indigenous children in regional and rural Australia. Future work could investigate other indigenous communities.
**Conflict of Interest.** The authors declare no conflict of interest.

### "He wants to play football but not available here": Parent perspectives of Aboriginal and Torres Strait Islander child physical activity

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**Introduction.** Physical activity, particularly sport, has important cultural significance to Aboriginal and Torres Strait Islander people. Aboriginal and Torres Strait Islander children have higher physical activity participation levels than non-Indigenous children. However, this trend reverses in adulthood, indicating that early adolescence is a critical period. This study aims to explore the types of physical activities Aboriginal and Torres Strait Islander children are undertaking, their activity preferences and barriers to participation. **Methods.** Indigenous ways of knowing, being and doing were drawn on as the overarching lens of the research. Data came from the Footprints in Time Longitudinal Study of Indigenous Children (LSIC) Wave 9 at age 8-13 years, from 11 diverse sites in Australia covering a variety of urban, regional, remote geographical regions. The child's parent was asked 1. Are there activities (child) would like to do, but can't? Why is that? and 2. What are a couple of things (child) enjoys doing? Using conventional content analysis, data were coded inductively to generate categories and subcategories to create overarching themes. **Results.** In total 1,268 parent interviews were conducted, representing 635 female and 633 male study children. There were 1,255 responses for activities child enjoys and nine themes were identified: creativity, educational, play, outing, socialising, screen-based, individual sports or exercise, team sports, and home-based. There were 444 responses for child preferences and barrier's and five themes were identified: barriers, individual sports, team sports, active travel and non-active. Culture was evident across the parent responses. Team sport emerged from both questions and football codes were most frequently mentioned. Dancing, hunting, and fishing emerged as activities children enjoy; these activities provide cultural significance in addition to exercise. **Conclusions.** This study provides context from the voices of parents around the types of activities Aboriginal and Torres Strait Islander children enjoy, what they would like to do, and barriers to participation. Physical activity could be enhanced and maintained through team sports and cultural expression, as well as opportunities for unstructured physical activity within safe communities.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Patterns in physical activity participation among Pasifika adults in Aotearoa New Zealand**

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**Introduction.** Physical activity participation data is limited among Pasifika adults in Aotearoa New Zealand (NZ). We aimed to examine differences in physical activity (aerobic, muscle-strengthening and combined) participation across Pasifika adults (18-65+ years). We hypothesise that self-identified ethnicity could highlight sub-populations that may benefit from culturally appropriate physical activity promotion. **Methods.** Data collected through Sport New Zealand Ihi Aotearoa's Active NZ adult survey (2017-2019) were analysed using binary logistic regression analyses, to calculate the odds of Pasifika adults (n=1103) meeting physical activity recommendations. Analyses were stratified by gender, with age, ethnicity, urbanicity and social deprivation included as covariates. Odds ratios (OR) were reported with 95% confidence intervals. Participants were arranged into four groups based on their self-reported ethnicity: Pasifika (those who identified as only Pasifika ethnicities); Pasifika/Māori, Pasifika/Asian, and Pasifika/European (those who identified as Pasifika and another ethnicity, prioritised in that order). **Results.** The proportion of Pasifika adults meeting physical activity recommendations varied across physical activity types (aerobic 47.6%, muscle-strengthening 35.8%, combined 28.8%). Physical activity also differed according to ethnicity, gender, age and social deprivation. For example, Pasifika/Māori men had significantly higher odds of meeting aerobic recommendations (OR=2.34[1.35-4.06]) compared with men who identified exclusively as Pasifika. Pasifika/Māori and Pasifika/European women had significantly higher odds of meeting aerobic (Pasifika/Māori OR=2.44[1.51-3.93]; Pasifika/European OR=2.45[1.61-3.73]), muscle-strengthening (Pasifika/Māori OR=1.88[1.14-3.09]; Pasifika/European OR=1.94[1.24-3.02]) and combined (Pasifika/Māori OR=2.78[1.62-4.76]; Pasifika/European OR=2.51[1.55-4.09]) physical activity recommendations than women who identified exclusively as Pasifika. Pasifika men and women aged 65+ years had lower odds of meeting aerobic (OR=0.41;0.43), muscle-strengthening (OR=0.45;0.40) and combined (OR=0.33;0.37) physical activity recommendations than those aged 18-24 years. Unlike men, Pasifika women residing in high-deprivation areas had lower odds of meeting aerobic physical activity recommendations than women in low-deprivation areas (OR=0.55[0.35 0.86]). **Conclusions.** Pasifika women who identify with a non-Pasifika ethnicity, for example, Pasifika/European, have much higher odds of meeting physical activity recommendations than those identifying exclusively as Pasifika ethnicities. Our findings indicate sub-populations within Pasifika communities of NZ could benefit from a culturally appropriate approach to physical activity promotion.
**Conflict of Interest:** JR is employed part-time by Sport New Zealand Ihi Aotearoa, which is responsible for the Active NZ survey.

**The future effectiveness of Indigenous Māori practice considerations on an Aotearoa adolescent-focused, active transport policy intervention: A modelling study.**

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**Introduction.** Active transportation is an effective way to enhance wellbeing by embedding more physical activity (PA) into an adolescent's daily routine. However, research on the future effect of active transportation policies centred around adolescents is limited. Additionally, in Aotearoa New Zealand (NZ), the indigenous Māori population have a unique perspective on PA that could enhance current Westernised policies to be more inclusive and effective for all. This study aimed to examine the potential impact of implementing both a national active transport policy change intervention and an active transport policy embedded in Māori tikanga practices on the future PA levels of NZ adolescents. **Methods.** We used data from a nationally representative sample (n=6906) of young people aged 12-17 years old between 2017 and 2020 in NZ. We modelled the projected impact on future PA levels of a hypothetical intervention focused on providing nationwide safe routes to schools. Intervention effects on six current determinants of future PA that were established in Bergen et al., (2023) determined changes to future PA. The second intervention modelled the same outcomes but had a cultural focus which utilised the Te Whetu Rehua framework to change five aspects of the original to create an as Māori approach. **Results.** The safe routes to school policy intervention substantially increased the current weekly PA duration and the amount of PA settings that adolescents participated in. However, the cultural intervention displayed additional substantial increases in social support and PA availability. Of the two interventions, the cultural intervention was more expensive but displayed better cost-effectiveness when considering the positive effect on future PA. The accumulative effects of both interventions yielded similar results to the cultural intervention. **Conclusions.** Including aspects of indigenous culture may enhance interventions designed for enhancing NZ adolescents future PA. Additionally, it is possible that the focused aim of this work on increasing future PA may not have captured the full impact of cultural active transport policies on wellbeing. Future work should therefore prioritise embedding cultural considerations into updated active transport policies for adolescents.
**Conflict of Interest.** The PhD of T.B. is funded by Sport NZ Ihi Aotearoa.

**Working together for children in the Pacific Islands: Current opportunities and perceptions to promoting physical activity and reducing screen time**

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**Introduction.** Pacific Islands Countries and Territories (PICT) have high rates of non-communicable diseases (NCDs) that can be prevented by ensuring healthy levels of physical activity and sedentary behaviour in childhood. This study identified opportunities for children to engage in healthy movement behaviours and explored PICT stakeholders' knowledge and attitudes towards physical activity and sedentary behaviour recommendations. **Methods.** The Social Ecological Model was used to explore stakeholder perceptions of physical activity and sedentary behaviour recommendations for children in PICT. Qualitative interviews were conducted (in person and online). Nine interviews were conducted in Fiji; three in French Polynesia; seven in New Caledonia and four in Wallis and Futuna between 2019 and 2022. French recordings were transcribed using HappyScribe.com and translated by one of the authors. Qualitative analysis was conducted and presented based on Bronfenbrenner's ecological theory and classified into the five categories of the Social Ecological Model. **Results.** At the individual level of the Social Ecological Model, stakeholders expressed concerns about the lack of awareness of 24hour movement guidelines. At the interpersonal level, concerns were expressed around negative parental attitudes towards physical activity and that parents felt they can't control screen time rules. At the organizational level, the importance of sports organisations to provide opportunities for children were highlighted while at an environmental level a key concern in Fiji and the French Territories was lack of urban/town planning and availability of green space to support children's physical activity. At the policy level, the need for policy changes to support physical activity promotion in schools was emphasised, highlighting that the school curriculum may be too prescriptive to adapt health messaging into day-to-day lessons. **Conclusions.** These valuable insights will guide the development of a social marketing campaign to promote healthy levels of physical activity and sedentary behaviour in children in PICT. To ensure campaign success, alignment with the WHO Global Action Plan for Physical Activity (GAPPA) is needed along with stakeholder input at all levels of the Social Ecological Model.
**Conflict of Interest.** The authors declare no relevant conflict of interest.

# School Interventions

**Development of the Capability, Opportunity, and Motivation to deliver Physical Activity in School Questionnaire (COM-PASQ) for teachers**

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**Introduction.** Schools are key settings for physical activity promotion and chronic disease prevention. Despite their central role in school-based physical activity promotion, we are not aware of any questionnaire that has been designed to assess teachers' capability, opportunity, and motivation to deliver physical activity programs. Therefore, the aim of our study was to develop and evaluate a brief measure to assess teachers' capability, opportunity, motivation to deliver physical activity in schools. **Methods.** The development of the Capability, Opportunity, and Motivation to deliver Physical Activity in School Questionnaire (COM-PASQ) involved two phases. In Phase 1, we invited experts in behaviour change and school-based physical activity programs (n=45) to participate in a Delphi study to achieve consensus on the questionnaire items. Participants were invited to review the measure and rank each item on the degree to which the items matched the content of the capability, opportunity, and motivation for behaviour (COM-B) model, by rating them on a 5-point scale ranging from 1 = Poor match to 5 = Excellent match. Participants were also invited to provide suggestions on how the items could be improved. In Phase 2 (on-going), primary and secondary teachers (n=200) will be invited to complete the measure on two occasions separated by one week to evaluate test-retest reliability. **Results.** Thirty-eight experts completed three review rounds of the Delphi study. The first round had an average score of 4.04, the second round 4.51, and the third (final) round had an average score of 4.77. The final measure includes 18 items, and six categories: physical capability, psychological capability, physical opportunity, social opportunity, reflective motivation, and automatic motivation. Phase 2 has started, and 27 teachers have completed the questionnaire. **Conclusions.** To our knowledge, the COM-PASQ is the first measure designed to assess teachers' capability, opportunity, and motivation to deliver physical activity in schools. The measure is adaptable and has been designed to support the evaluation of school-based physical activity programs in primary and secondary schools.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Effect of school-based HIIT intervention on student's cardiorespiratory fitness, muscular fitness, and executive function: Findings from Making a HIIT**

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**Introduction.** The Making a HIIT study incorporated an 8-week high-intensity interval training (HIIT) intervention within Health and Physical Education (HPE) lessons using HIIT workouts that had previously been co-designed with teachers and students. The primary aim of this study was to examine the effect of the intervention on students' cardiorespiratory fitness (CRF). Secondary aims included examining the effect of the HIIT intervention on muscular fitness, inhibition, and working memory. **Methods.** Students (aged 12-14 years) at two schools participated. Eight classes (185 students, 86 girls) completed the HIIT intervention, which consisted of a 10-minute HIIT workout at the start of each HPE lesson for 8 weeks. The control group included four classes (73 students, 39 girls) and continued their normal HPE lessons. Before and after the intervention, students completed a 20-metre shuttle run (CRF), standing long jump (muscular fitness), antisaccade task (inhibition), and visual arrays task (working memory). Changes over time and between groups were assessed using mixed-effects models. **Results.** During the intervention, an average of 9 workouts were delivered and students attended an average of 6 workouts. The average time students spent with a heart rate < 80% of maximum each lesson was 9 minutes in the intervention group and 5 minutes in the control group. Both groups had statistically significant improvements in their CRF ($\beta$ = 3.06 laps; p = 0.004), muscular fitness ($\beta$ = 5.89 cm; p=0.001), and inhibition ($\beta$ = 4.23 percentage points; p=0.001); however, there were no significant between-group differences. There were no significant changes to working memory. **Conclusions.** The intervention had no effect on the examined outcomes. This could be explained by the low dosage of HIIT completed during the intervention or the comparable amount of high-intensity activity completed by the control group. It will be important for future studies to consider how to increase the dosage of HIIT, potentially by utilising other timepoints during the school day, and to ensure that the control group's

activity is monitored to enable a genuine between-group comparison.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Feasibility and preliminary efficacy of the 'Muscle Movers' program: A teacher-delivered intervention to support children's muscle-strengthening physical activity participation**

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**Introduction.** School-based interventions can increase children's physical activity (PA) and fitness, but few have focused on muscle-strengthening activity (MSA). Of those that have, most have been delivered by external physical education (PE) specialists or research staff. Utilising classroom teachers is a more cost-effective, and scalable delivery model. But generalist teachers experience numerous barriers to delivering PA programs, and many view MSA as particularly complex. Our aim was to evaluate the feasibility and preliminary efficacy of 'Muscle Movers', a teacher delivered MSA intervention for primary school children. **Methods.** We conducted a single-group, pre-post trial, with two classes of Stage 2 children (Grade 3-4; 9-10 years; N=30) from one primary school in New South Wales, Australia. Two teachers delivered the 'Muscle Movers' program over 6-weeks (Nov-Dec 2022), which involved curriculum-aligned PE lessons (1 x 45mins/week), classroom energiser breaks (2 x 5 mins/week) and active homework tasks (1 x 10 mins/week). Feasibility measures (acceptability, implementation, practicality, and adaptability) were collected from teachers post-intervention using survey and interview methods. Students' muscular fitness and perceived strength were assessed immediately before and after intervention delivery. Analyses involved descriptive statistics and paired t-tests, with Cohen's d as a measure of effect size. **Results.** Teachers (5.0±0.0 out of 5) and students (4.1±0.9) reported high levels of satisfaction, and teachers found the intervention to be practical and adaptable. Implementation fidelity was strong, with teachers facilitating all six PE lessons and more than twice the number of intended energiser breaks, but only 5 of 6 homework tasks. No meaningful changes in lower body strength or perceived strength were found, but a moderate improvement in children's upper-body muscular endurance was observed (mean [95%CI] = 2.2 [0.7 to 3.8] repetitions; d = 0.61). **Conclusions.** Muscle Movers was highly feasible for generalist teachers with no prior MSA-related training and our preliminary data suggest the program may benefit children's upper body muscular endurance. Our positive preliminary findings justify further evaluation of this intervention using an appropriately powered randomised controlled trial.
**Conflict of Interest.** Project funding was provided by the National Heart Foundation of Australia. The authors declare no relevant conflict of interest in relation to this work.

**The effectiveness of secondary-school based interventions on the future physical activity of Aotearoa New Zealand adolescents: A modelling study**

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**Introduction.** Secondary schools are an important setting for promoting varied physical activity (PA) opportunities for adolescents. However, research on the future effect of secondary school-based PA is limited. This study aimed to examine the potential impact of different Aotearoa New Zealand (NZ) secondary school-based interventions on the future PA of adolescents. **Methods.** We used data from a nationally representative sample (n=6906) of young people aged 12-17 years old between 2017 and 2020 in NZ. We modelled the projected impact on future PA levels of four hypothetical secondary school-based interventions. Intervention effects on six current determinants of future PA that were established in Bergen et al., (2023) determined changes to future PA. These interventions involved, the technological augmentation of physical education lessons, the formation of nature-based play areas, student-led initiatives, and physically active learning (PAL). **Results.** Student-led initiatives increased determinant scores by the highest amount overall, scoring the highest in current weekly PA duration, physical literacy, and social support scores. Contrastingly, the formation of nature-based play areas increased future physical activity by the lowest amount overall yet scored the best in increasing the number of PA types and settings. Technological augmentation and PAL were the most cost-effective methods of increasing future PA. The results displayed strong synergy between all interventions, with the accumulative effects of each intervention substantially increasing future physical activity more than a single intervention. **Conclusions.** Promoting varied secondary school interventions appears to be an effective method for increasing future PA. Interventions appear most effective when they focus on providing adolescents with the ability to conduct PA on their own terms. Future work should evaluate the effect

of these interventions in practice to determine their validity.
**Conflict of Interest:** The PhD of T.B. is funded by Sport NZ.

**Acceptability, dose delivered, and fidelity of a school-based physical activity leadership program: The Learning to Lead cluster randomised controlled trial**

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**Introduction.** Schools are key settings for physical activity promotion in youth. However, school physical activity programs are rarely implemented as intended. The aim of this study was to assess teacher acceptability, dose delivered, and fidelity of a school-based physical activity leadership program in NSW primary schools. **Methods.** We are currently conducting a two-arm parallel group cluster randomised controlled trial in 20 primary schools in New South Wales, Australia. In the first cohort, five schools were randomised to a wait list control group, and five schools were randomised to the Learning to Lead (L2L) program. L2L was implemented in three phases. In Phase 1, teachers (n = 10) received training (1 x 6-hour professional learning workshop) from the research team to deliver the program. In Phase 2, teachers delivered the leadership training (6 x 40-minute lessons) to Peer leaders (n = 253, aged 10-12 years). In Phase 3, peer leaders delivered a fundamental movement skill (FMS) program to their younger peers (n = 236, aged 8-10 years). The FMS program, consisting of 12 x 30-minute lessons, was delivered over one school term (10 weeks). Following Phase 3, teachers completed semi-structured questionnaires to determine their satisfaction with the program, training, and implementation support they received (acceptability). Teachers were asked to provide evidence that the peer leadership training and FMS sessions were delivered (dose delivered). The research team conducted 3 observations/school using a structured checklist to determine if the sessions were delivered as intended (fidelity). **Results.** Teachers were highly satisfied with the L2L program and training they received (mean = 4.8/5, 1 = Strongly Disagree to 5 = Strongly Agree). Nine teachers delivered all 6 leadership lessons (one teacher delivered five lessons). On average, schools delivered 9/12 FMS sessions. Mean fidelity score was 8.1/10 on the structured observation checklist. **Conclusions.** Our findings suggest that the L2L program is acceptable and feasible in NSW primary schools. Based on our observations, the program was delivered with a high degree of fidelity. The L2L program has the potential to be scaled-up in NSW primary schools, pending the establishment of effectiveness.

**Exploring the use of game-based approaches to teaching basketball in Chinese primary school physical education: The MASTER pilot RCT**

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**Introduction.** The aim of this study was to examine the preliminary feasibility and efficacy of implementing a tailored version of the MASTER coach education program in Chinese primary schools with Physical Education (PE) teachers delivering basketball lessons. **Methods.** A total of 20 primary schools in Beijing, China were recruited, with one PE teacher and their class (N=715 students aged 9-12yrs) from each school included in the study and randomly allocated to the MASTER intervention (n=10) or wait-list control (n=10) group. Intervention PE teachers participate in an 8-week multi-component intervention focusing on creating a positive learning environment and a games-based approach (GBA) to teaching in PE, including an online MASTER education workshop mentoring and discussion forum facilitated by the research team, and peer evaluations. The control group continued with their usual practices. At baseline and 8-week

follow-up assessments, teaching behaviours and feedback captured during videoed PE lessons were assessed using the MASTER assessment tool, and teachers completed a questionnaire evaluating their confidence and competence to teach. Students also completed a questionnaire assessing well-being, enjoyment, physical self-perceptions, and motivation. Intervention effects were analysed using linear mixed models. Feasibility and efficacy were assessed using measures of recruitment, retention, adherence, and satisfaction. **Results.** Compared to the control group, a significant treatment effect was observed for the proportion of playing-form activities delivered during PE (P<0.001) and for teachers' perceptions of confidence (P<0.001) and competence (P<0.001) to teach in favour of the MASTER group. However, no significant differences between groups were found for Active Learning Time. Significant differences between groups were observed for students' well-being, physical self-perceptions, enjoyment, and motivation (P<0.001). Process evaluation results also indicate high satisfaction with the program by teachers for perceived benefits, enjoyment, and future plans observed (mean across 26 items 4.77/5.00). **Conclusions.** This study demonstrated the feasibility and efficacy of delivering the MASTER program in Chinese primary schools, and in facilitating improvements in multiple teacher and student outcomes.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Impact of a professional learning workshop on teachers' capability, opportunity, and motivation to teach resistance training in schools**

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**Introduction.** Schools play a crucial role in promoting physical activity. Training teachers via professional learning workshops has been identified as an effective strategy for implementing school-based physical activity interventions. However, little is known about the efficacy of teacher professional learning focused on resistance training. Therefore, our primary aim was to assess the effect of the Resistance Training for Teens (RT4T) professional learning workshop on teachers' capability, opportunity, and motivation to teach resistance training in schools. Our secondary aim was to determine teachers' satisfaction with the RT4T workshop. **Methods.** This study uses data from an ongoing hybrid type 3 implementation-effectiveness trial that is evaluating the effects of three implementation support models on the proportion of students (ages 14-16 years) who have participated in the RT4T program. Secondary schools in New South Wales,

Australia (n=33) were randomised to one of three groups: (i) Low support (i.e., usual care), (ii) Moderate, or (iii) High implementation support. Participating teachers (n=49) completed a pre- and post-workshop survey based on the Capability, Opportunity, Motivation and Behaviour Model: (i) physical capability and (ii) psychological capability, (iii) physical opportunity and (iv) social opportunity, and (v) reflective motivation, and (vi) automatic motivation. All items (n=18) utilised a 5-point Likert scale (1=Strongly disagree to 5=Strongly agree). Paired samples t-tests were used to evaluate the effects of the RT4T professional learning workshop (completed before and after the workshop). Teachers also completed a brief questionnaire assessing their satisfaction with the RT4T workshop. **Results.** Forty-three teachers completed the pre- and post-training survey. The RT4T professional learning workshop increased teachers' psychological capability (d=.92, p=0.001), physical opportunity (d=.44, p=0.006), and automatic motivation (d=.40, p=0.012) to deliver the RT4T program. Teachers were highly satisfied with the training they received (4.8/5). **Conclusions.** The full-day RT4T professional learning workshop was well-received by teachers. In addition, the workshop improved aspects of teachers' capability, opportunity, and motivation to teach resistance training in schools.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Comparative effectiveness of physical activity interventions on cognitive function in children and adolescents with neurodevelopmental disorders: A network meta-analysis**

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**Introduction.** Children with Neurodevelopmental Disorders (NDDs) often experience deficits in cognitive function, impacting their personal and social aspects of life. Although prior pairwise meta-analyses have evaluated the efficacy of physical activity (PA) interventions for improving cognitive function, the comparative effectiveness of different PA interventions in this population remains unclear. This study aimed to compare the relative effectiveness of PA interventions on cognitive function in children and adolescents with NDDs. **Methods.** Web of Science, PubMed, Medline, APA PsycINFO, Embase, CINAHL, and SPORTDiscus were systematically searched from inception until September 2023. The included studies were randomized controlled trials (RCTs) in children and adolescents with NDDs aged 5 to 17 years and compared PA intervention with other non-pharmacological treatments. A random-effects network meta-analysis (NMA) in a frequentist framework was conducted to synthesize continuous data as standardized mean difference (SMD) and dichotomous as odd ratio (OR) along with 95% confidence interval (95% CI). The primary outcome was cognitive functions, and the secondary outcome was treatment acceptability (discontinuation for any reason). This review was registered with PROSPERO (CRD42023409606). **Results.** Thirty-three RCTs involving 1,463 participants were eligible for inclusion, with a mean age of 10.0 years. PA interventions included aerobic exercise (AE), mind-body exercise (MBE), exergaming, and multi-component physical activity (MPA). The domains of cognitive functions under investigation encompassed attention, memory, and executive functions. Exergaming, MPA, and MBE significantly improved specific cognitive domains (SMD: 0.68 to 1.65). Exergaming had the highest probability of being the most effective PA type according to the surface under the cumulative ranking. However, AE did not yield significant effects on the three domains. No significant differences regarding acceptability among all treatments were observed, with 95% CI containing the null value (OR=1.0). **Conclusions.** This NMA supports the implementation of PA intervention an alternative treatment for improving cognitive functions in children and adolescents with NDDs. Exergaming, MPA, and MBE would be the appropriate choices.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

## Policy, Implementation & Stakeholders

**Translation of research evidence to physical activity (PA) policies: An audit of State (New South Wales, Australia) Government PA policies (2006-2019)**

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**Introduction.** Many reports have called for better translation of PA research evidence to policy and practice (Giles-Corti et al., 2015). The recommended content of PA policies has also been extensively documented (Bull et al., 2015). Yet

governments and the public often prefer policies that reflect considerations and concerns other than evidence alone (Carney and Oliver, 2017). An audit of the New South Wales (NSW) State Governments over-arching strategic plan (State Plan/Premier's Priorities 2006-2019) was undertaken to identify policy characteristics beyond traditional research evidence recommendations that impact Statewide PA policy development. **Methods.** The PA policy audit tool (Nau et al., 2019) was utilised to review NSW State PA policies contained within the six NSW State Plan/Premier's Priorities documents prepared between 2006-2019. The audit tool assessed the PA policies against predefined criteria including policy characteristics, strategic approaches to PA, implementation processes and evaluation. **Results.** The review identified 36 PA related State policies and targets for the period from 2006-2019. The most frequent characteristics of State Government PA policies included a single agency focus (n=29, 80%), primarily targeting the whole population (n=24, 66%), with a general health and wellbeing priority (n=29, 80%) and a measurement timeframe beyond five years (n=26, 72%). **Conclusions.** Traditional PA policy literature prescribes the need for cross sectoral approaches, providing co-benefit opportunities, targeting specific under-represented groups (e.g. people from lower socioeconomic backgrounds) to address specific chronic disease issues (e.g. overweight and obesity) within measurable timeframes (Sallis, 2006; WHO, 2018). The clear lack of alignment between proposed evidence-based PA policy content and characteristics of the most common NSW PA policies, helps explain why ongoing calls for the development of a national cross-sectoral (whole-of-government) PA strategy for Australia (National Heart Foundation, 2014) have not eventuated. The current study demonstrates that PA policy advocates need to consider variables beyond research evidence alone when negotiating the policy development process.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Establishing a genuine partnership across cultures, disciplines and sectors to promote wellbeing through physical activity and sport in New Zealand

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**Purpose.** The Te Kākano Research Network was established to promote wellbeing through sport and physical activity research in Aotearoa New Zealand. The network is innovative in its cross-sectoral and multidisciplinary approach that mobilises Māori knowledge (mātauranga Māori). **Project Description.** In 2018, we developed Te Kākano as part of a Centre for Research Excellence (CoRE) funding bid. Although we were unsuccessful in obtaining CoRE funding, the learnings, networks, and ideas generated were valuable. The intensive process of developing the CoRE brought together scholars, leaders, and experts from around Aotearoa, and resulted in new collaborations, insights, and a bicultural approach to leading and conducting research that draws upon mātauranga Māori in creating a "third space". We have undertaken a critical reflection to evaluate our process of engagement. We use the Māori engagement model to document the key moments of engagement that were critical to the establishment of a genuine partnership and to critique the learning that has taken place. A range of diverse perspectives was sought for this reflective process, including Māori academics and community representatives, sector representatives, and physical activity and sport researchers. The outcomes of this reflection address the gaps in the understanding of the process of building meaningful collaborations across sectors and disciplines, especially when it comes to mobilising Indigenous knowledge. While the initial funding bid was unsuccessful, Te Kākano has since been established as a research network hosted by AUT with members from seven New Zealand universities and a range of sector partners. We are currently supporting four early career researchers (ECRs) with research grants to mobilise knowledge from their projects in physical activity and sport research. **Conclusions.** Te Kākano Research Network provides an example of a cross-sectoral and multidisciplinary collaboration that seeks to mobilise Indigenous knowledge to promote wellbeing through physical activity and sport.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

### Challenges and successes of establishing a cross-agency group for promoting national physical activity policy and practice

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**Purpose.** It is widely recognised that the effective promotion of physical activity cuts across the portfolios of multiple government and non-government stakeholders. Whilst there have been numerous calls for genuine cross-agency partnership to promote physical activity, there are limited examples of these being established. In recent years a cross-agency group has been established in Aotearoa New Zealand (NZ) to coordinate and oversee the promotion of quality

physical activity opportunities. **Policy Description.** The cross-agency group has been led by Sport NZ Ihi Aotearoa and comprises more than 15 government and non-government organisations. Membership of the group is voluntary and open to personnel from any agency with a genuine interest in the promotion of physical activity. Key challenges have included: retaining involvement of stakeholders during periods of high staff turnover; ensuring there is top-down support so that there is genuine buy-in from participating agencies; engaging the appropriate people from each organisation (i.e. individuals across the relevant detail, but also senior enough to influence change). The group has worked together to develop a National Plan for Physical Activity Promotion that was informed by the WHO Global Action Plan (GAPPA). This is now being used to guide physical activity-related work across government and has led to some key successes that have included: better coordination across several government agencies; improved efficiency in initiative development; joint delivery models for physical activity promotion. Evaluation of progress occurs annually and includes a focus on the impact of physical activity on national wellbeing priorities such as: increasing engagement in school; improving health outcomes; increasing uptake of active transport to and from schools. **Conclusions.** While cross-agency work can be challenging, the benefits that can be achieved from such an approach are multiplicative. Importantly, these benefits are broader than the specific work programmes outlined in the National Plan for Physical Activity Promotion, because the establishment of new relationships has led to additional efficiencies in other work areas.
**Conflict of Interest.** The authors are employees of Sport NZ and are actively engaged in researching and promoting physical activity policy and practice in NZ.

**Whole-of-system approach to population physical activity promotion in British Columbia: Attributes framework and causal loop diagramming to identify leverage points**

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**Introduction.** Whole-of-system approaches to population physical activity promotion (PPAP) are increasingly called for. The purpose of this research was to use an innovative approach, based upon a framework of seven interdependent attributes and associated dimensions of an effective system for NCD prevention, to examine how to effectively coordinate multisectoral PPAP at the provincial level and elevate physical activity among all British Columbians. **Methods.** We completed a scoping review to explore complex systems methods used in PPAP research and found that group model building (GMB) aligned well with the attributes framework. We then conducted stakeholder interviews (n=19) and workshops (n=16) to describe attributes in the current provincial system. Descriptive statements of attributes were translated into system variables and a group model building (GMB) session (n=14) was facilitated to create a causal loop diagram. Finally, feedback loops among priority variables were analysed and leverage points were identified as to where to strengthen the provincial system. **Results.** A condensed framework was developed (based upon stakeholder perspectives) that consisted of four attributes and five associated new dimensions. The resultant causal loop diagram from GMB cantered on the top four priority variables (attributes and dimensions): 1) Visible policy support for PPAP actions at all levels (Leadership, Governance); 2) Sustained political leadership from senior policy makers and appropriate government departments (Leadership, Political); 3) Connectivity between researchers, policy makers and practitioners for integrated knowledge translation (Resources, Knowledge Translation); and 4) Effective coordination of population physical activity actions (Implementation of desired actions, Coordination). Ten other priority variables (attributes and dimensions) were included in the final diagram. Ninety-three feedback loops were analysed and five leverage points were prioritized for intervention in the provincial system to more effectively coordinate multisectoral PPAP. **Conclusions.** This research is significant in terms of its innovative whole-of-system approach to PPAP. The value of the attributes framework as a foundation to the approach was demonstrated in terms of its comprehensiveness in describing, assessing and strengthening the system. The impact of GMB and the creation of a causal loop diagram was realized in terms of pinpointing where to intervene to build a stronger multisectoral provincial system.
**Conflict of Interest.** No relevant conflict of interest.

**Delivering change: The role of local government in physical activity promotion**

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**Introduction.** Local governments are well placed to promote physical activity (PA) given their close proximity to the community and jurisdiction over local facilities and infrastructure. However, there remains a lack of research describing

local government's role in PA promotion which limits the opportunity for identifying best practices and evidence translation. The Toowoomba Regional Council (TRC) has delivered the Change Project for PA promotion since 2012 creating accessible, low cost, recreational PA opportunities in the community. The aim of this study is to describe the enablers and barriers to PA promotion in delivering TRC's Change Project. **Methods.** This study utilised an instrumental case study design. Qualitative methods were employed to collect and analyse data sources including three TRC and Change Project reports and a series of semi-structured interviews between the researcher (author 1) and TRC Healthy Living and Active Recreation Officer (author 2). Inductive thematic analysis identified enablers and barriers from the direct experience of project staff. **Results.** Findings demonstrate the Change Project's success in increasing PA, perceived health, and social connectedness. Barriers to delivery and expansion included lack of policy and legislation to support PA promotion, limited budget, and the 'silo' nature of local government portfolios limiting joined-up decision making and resource sharing. The political will of individuals such as elected officials was a significant enabler to provide the support of PA policy, priority, and budget. Innovative strategies to overcome budget constraints were implemented including partnerships with PA providers which maximise council strengths in advertising, community reach, and venue hire allowing providers to deliver PA opportunities at low cost. **Conclusions.** These findings provide insight into the complexity of the local government experience of delivering PA promotion initiatives. Findings can be translated to strengthen local government capacity to adopt integrated planning to promote PA.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Physical activity grants for community settings: Heart Foundation's Active Australia Innovation Challenge

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**Purpose.** More than half of adults in Australia are not active enough, a key risk factor contributing to heart disease. To tackle this, the most effective preventative approaches are place-based, evidence-informed and led by local individuals who understand their community's needs. The Active Australia Innovation Challenge (AAIC) is a grant program delivered by the National Heart Foundation of Australia to fund new and innovative projects to encourage people to lead more active lifestyles. **Project Description.** The AAIC was established in 2018 as part of the Australian Government Department of Health and Aged Care Healthy Heart Initiative (HHI), of which the Heart Foundation was allocated funding to lead the Prime Minister's Active Australia (PMAA) component. Between 2018 and 2021, 44 groups from around Australia were awarded $10,000 to make their innovative ideas for more active communities a reality. Evaluation was conducted to assess the outcomes and impacts of the AAIC program. Analysis was conducted on existing data from 36 of the 44 projects awarded, via surveys and key informant interviews. The aim was to understand experiences and learnings from grant recipients and gather insights to inform future iterations of the AAIC. Projects were successful in supporting 6,177 Australians to become more active. All projects aimed to target people not meeting the Australian Physical Activity and Sedentary Behaviour Guidelines, people at risk of chronic disease, and people living in communities with high levels of physical inactivity. The grant program saw extensive capacity-building through partnerships, volunteer training and leadership roles being created. Finally, 67% of survey participants have seen their programs continue, and 29% of participants have collectively attracted over $1.2 million of additional funding. **Conclusions.** Successful projects demonstrated innovation for their community to be physically active. Grant winners reported that the program had addressed an existing gap and program designs met the needs of their priority group. Evaluation learnings will support development of resources, showcase documents to support the next round of innovative community projects.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### A novel approach to articulating the value of physical activity: Social return on investment including an Indigenous worldview

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**Purpose.** Articulating the broad value of physical activity participation across government is an ongoing challenge internationally. Sport New Zealand Ihi Aotearoa is a kaitiaki (guardian) of the play, active recreation and sport (PARS) sector in Aotearoa New Zealand (NZ). It has undertaken an innovative approach to understanding the population-level wellbeing generated by leisure-time physical activity participation. **Policy Description.** The NZ Treasury's Living Standards Framework was used as a basis for developing the Sport NZ outcomes framework, which articulates the wellbeing domains most strongly associated with leisure-time physical activity. This was also informed by extensive stakeholder discussions, existing literature and novel survey-based research across the sector. International evidence and secondary analysis of NZ data were then used to generate values for wellbeing outcome in the framework. These were

collated to establish an SROI tool that comprised nine outcomes across six domains of wellbeing including: two health outcomes; three outcomes related to subjective wellbeing; and one outcome each from income, consumption and wealth; work, care and volunteering; family and friends; safety. The tool also examined the value of eight outcomes articulated by Māori stakeholders without monetising these in the SROI. The tool was evaluated by Social Value International and used to model conservative estimates of the current value of existing investment in PARS in NZ. **Conclusions.** The SROI identified a $2.12 return to NZ for every $1 spent (inputs = NZ$7.9bn, outputs = NZ$16.8bn). The majority of value flowed to the general population through health and subjective wellbeing outcomes. Qualitative analysis demonstrated that a significant contribution to Māori wellbeing, particularly through strengthening intergenerational relationships and reinforcing cultural values, beliefs, social norms and knowledge. This is the first time a national SROI of its kind has been completed in NZ and it is the first time globally that Indigenous outcomes have been included in this type of SROI analysis. The results are conservative, and future research should address evidence gaps to improve value estimations.
**Conflict of Interest.** All authors are employees of Sport NZ and engage in researching and promoting physical activity policy and practice.

**Physical activity and wellbeing in financially vulnerable young people: Working with non-sport sector partners to improve reach and impact**

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**Purpose.** Up to 14% of children in Aotearoa New Zealand (NZ) live in financial hardship and this is known to negatively impact participation in play, active recreation, and sport (PARS). Sport NZ is a kaitiaki (guardian) of the PARS sector in NZ and has begun working with new partners that have broader agendas than just physical activity promotion. The aim is to strengthen the focus on a 'through' physical activity approach that achieves wellbeing outcomes in population groups most in need. **Project Description.** Sport NZ has led a shift from ‘sport for sport’ to a ‘development through sport’ approach in the physical activity policy/practice environment in NZ. While both approaches encourage sport participation, ‘sport for sport’ focuses on progression-oriented actions to grow the sport itself, and nurturing talent to encourage elite-level success. In contrast, ‘development through sport’ is concerned with the use of sport to achieve wider individual and societal development goals. It highlights the breadth of agendas to which sport may contribute. Active Me / Kia Tā and Te Kāwai are initiatives co-designed with Variety NZ and Te Pātahitanga o Te Waipounamu to support the wellbeing of young people who are in circumstances of financial hardship to access opportunities for quality physical activity. Evaluation results demonstrate both funds are reducing financial barriers for young people and their participation has increased as a result. This is directly benefitting their physical development, confidence, independence, social, emotional and mental wellbeing. Positive impacts for whānau, sports teams, and communities have also been demonstrated. **Conclusions.** There has been further investment across government to expand these projects. Additional work is being undertaken to explore how sports organisations can partner more closely with stakeholders that work with the most vulnerable young in NZ. This is adding to the broader understanding of providing support for all young people to access quality physical activity opportunities, particularly how to address the challenges caused by financial hardship.
**Conflict of Interest.** The authors are employees of Sport NZ and are actively engaged in researching and promoting PARS policy and practice in NZ.

## Older Adults II

**Social support a declining resource for physical activity across 9 years in adults aged 60+ years**

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**Introduction.** In Australia, nearly two-thirds (65%) of disease burden due to physical inactivity is attributed to adults aged 65+ years. Social support can positively influence physical activity participation; however, little is known about how much social support for physical activity (SSPA) older adults receive and if this differs as people age. This study examined the amount and types of SSPA reported by adults aged 60+ years and if this changed across the nine-year study period. **Methods.** Participants in this population-based longitudinal sample of 1984 adults (mean age at baseline = 61.7 years, SD = 1.8) lived in an Australian capital city. At each time point, participants were asked to rate how often family or

friends provided emotional, companionship, instrumental, and informational SSPA over the last three months on a 5-item scale (range: never to very often). Data were collected via mail surveys over four time points and analysed using linear mixed models. **Results.** The most and least common types of SSPA were emotional and instrumental, with 25% and 17% of participants receiving these types often/very often. Those living with others had 10% more SSPA than those living alone (p<001), and those with at least a bachelor's degree had 12% more SSPA than those with a maximum of 10 years school education (p<001). Total SSPA declined by 16% across the nine-year study period. Companionship had the greatest decline among SSPA types (18%, p<001), and emotional support had the least decline (12%, p<001). **Conclusions.** Older adults have low levels of SSPA, and this declines over time. Future research could explore the factors contributing to declines in all types of SSPA in older adults. More intervention trials are required to establish evidence to improve SSPA for older adults, prioritising those living alone and those with low educational attainment.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### The Exercise Right for Active Ageing study: Participation in community-based exercise classes by older Australians during the COVID-19 pandemic

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**Introduction.** The Exercise Right for Active Ageing program delivered community-based exercise classes to older Australians during the COVID-19 pandemic in Australia. The aim of this study was to determine factors associated with participation of older Australians in the program. **Methods.** This pre-post study included community-dwelling older adults (<65 years) from across Australia. The intervention consisted of 12 one-hour low to moderate-intensity exercise classes of a range of types, delivered weekly in-person or online by university-trained accredited exercise scientists or physiologists (AESs/AEPs). Negative binomial regression was used to determine factors associated with the primary outcome (number of classes attended/12). **Results.** Of 6,949 participants recruited, 6,626 attended <1 class and were included in the primary analysis (95%). 49% of participants attended all 12 classes. Higher class attendance was associated with yoga/flexibility/mobility classes, attendance at a free trial class (adjusted incidence rate ratio [95% CI]: 1.05 [1.03, 1.08]) and online classes (1.19 [1.11, 1.26]). Lower class attendance was associated with state of residence, living in inner regional areas (0.95 [0.93, 0.98]) and having >2 comorbidities (0.97 [0.95, 0.99]). **Conclusions.** Moderate class attendance suggests the Exercise Right for Active Ageing program was well-received by older Australians, particularly in states less impacted by COVID-19 lockdowns (Western Australia), for those with fewer comorbidities and those living in metropolitan areas.

### Associations between dog ownership and physical function among older adults: Findings from the HABITAT cohort

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**Introduction.** Physical function typically decreases with age and is associated with poorer health, wellbeing, and quality of life. Pet ownership is common among older adults and has potential to contribute to aspects of healthy aging. The positive effects of dog ownership on physical activity could be one way through which physical function is maintained. We hypothesized that dog ownership would be associated with maintaining physical function in community-dwelling older adults participating in the 10-year cohort study of How Areas in Brisbane Influence healTh and AcTivity (HABITAT). **Methods.** A clinical subsample of participants (n=767) completed seven functional fitness assessments (grip strength, 30-second chair stand, arm curl, 2-minute step in place, sit and reach, back scratch, 8-foot up-and-go) and self-reported physical function in 2014 and 2016. Dog ownership status was obtained from matched survey data measured in 2013 and 2016. Linear mixed effects models were used to examine the cross-sectional and longitudinal associations between dog ownership and older adults physical function outcomes; longitudinal models included the interaction between dog ownership and time. **Results.** At the first clinical assessment, participants' mean age was 60.4 years and 60% were female. Preliminary models adjusted for age and sex showed no significant cross-sectional associations between dog ownership and any functional fitness assessment or self-reported physical function (all p-values<0.05). Grip strength and self-reported physical function declined significantly over the follow up period, while 30-second chair stand, arm curl, 2-minute step in place, and 8-foot up-and-go significantly improved; however, none of these changes were moderated by

dog ownership. **Conclusions.** There was no evidence of association between dog ownership and objective or self-report physical function outcomes in this cohort subsample. Further research will examine the longitudinal effects of dog ownership on older adults' physical activity including whether physical function in dog owning older adults varies by amount of dog-facilitated physical activity.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Strategies to boost recruitment of older people to physical activity trials**

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**Introduction.** Many older people do not meet physical activity (PA) guidelines. Studies designed to promote PA in older people often struggle to recruit large representative samples. This presentation outlines the strategies used in two large NHMRC-funded trials to successfully boost recruitment and may assist others recruiting older people to PA trials. **Methods.** Coaching for Healthy Ageing (CHAnGE) was a cluster randomised controlled trial (RCT, n=605) testing the effectiveness of an intervention using health coaching and activity trackers compared to a healthy eating program on PA and falls in people aged 60+. Participants were recruited through in-person presentations to community groups in metropolitan and regional areas. Coaching and Exercise for Better Walking (ComeBACK) is a RCT (n=512) investigating the impact of health coaching compared to motivational text messages on PA in adults with self-reported walking difficulties. Participants were recruited from the community (e.g. newsletters, radio, social media, webinars, brochures, flyers) and health services (e.g. community rehabilitation, rheumatology clinics). Thematic analysis of CHAnGE participant interviews and feedback from ComeBACK trial recruitment documents and staff were used to identify the factors associated with recruitment success. **Results.** CHAnGE recruitment presentations were successful as they allowed participants to build rapport with intervention staff, built value expectancy, and provided a sense of achievability and understanding of the PA needs of older people beyond health benefits (e.g. independence, dignity, quality of life). Recruiting existing community groups enhanced social connectedness and accountability. To boost health service recruitment, which can be difficult due to high caseload and staff shortages, ComeBACK identified site champions, held recruitment site presentations, and provided regular recruitment newsletter updates. Both trials found success by recruiting in spaces older people were already present (online and in-person), providing them with opportunities they may not have sought themselves. **Conclusions.** Understanding the needs of older people, providing relatable and easy to understand content, and ease of access help boost recruitment of older people in PA trials. By implementing these strategies we attracted older participants with a range of functional abilities from different geographical regions.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Older adults' companions for physical activity: Who, how often and changes over time**

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**Introduction.** Companionship for physical activity is one of the strongest types of social support for physical activity. However, little is known about how often older adults are physically active with a companion, who the companions are, and if this changes over time. This research aimed to assess how often adults aged 60+ years were physically active with a partner, family, close friends, and neighbours over seven years. **Methods.** This study used a longitudinal design. Participants were a population-based sample of 2062 adults (mean age at baseline = 62.9 years, SD = 2.1) living in an Australian capital city. At each time point, participants were asked how often they did physical activity with each type of companion in the last month. Frequency data were collapsed into 1-4x/month and <5x/month. Data were collected via mail surveys over four-time points and analysed using multinomial regression (odds ratio and 95% confidence interval reported). **Results.** Partner was the most frequent physical activity companion at all time points. From baseline to seven years later, family companionship for physical activity had the greatest decline for both 1-4x/month (0.79 [0.64-0.98]) and <5x/month (0.54 [0.36 - 0.80]). There were also declines in physical activity done 1-4x/month with a partner (0.75, [0.62-0.92]), friends (0.55 [0.44-0.68]), and neighbours (0.79 [0.64-0.98]). Physical activity with friends or neighbours 5x/month did not decline. **Conclusions.** The sustainability of companionship for physical activity differs by companion

type and activity frequency. These findings highlight the need for further research to examine the factors contributing to declines over time in physical activity done with different types of companions and the potential of social support interventions to address this.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Telephone-based health coaching to increase physical activity in older adults: Key elements for success**

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**Introduction.** In Australia, fifty percent of adults aged 65 and over are insufficiently active. Health coaching is a client-centred, collaborative intervention aimed at achieving lasting lifestyle change and is proven to increase physical activity. We have conducted three randomised controlled trials that have successfully used health coaching to support physical activity in almost 700 people aged 50 and over. This includes the Active Women Over 50 pilot study (n=60), the Coaching for Healthy Ageing trial (n=290, NHMRC-funded) and the Coaching and Exercise for Better Walking trial (n=343, NHMRC-funded). This presentation will outline the approaches used, key aspects of coaching and learnings from these trials. **Methods.** Research physiotherapists trained in health coaching engaged with participants by phone to provide motivational interviewing and co-develop goals and physical activity plans. The frequency of phone calls varied between trials, from a one-off coaching session to fortnightly or monthly sessions, delivered over 6 to 12 months. **Results.** Participants described highly supportive relationships with their health coaches which sustained their commitment to physical activity. We identified key strategies in the practical delivery of health coaching that fostered this therapeutic alliance. A suite of health coaching techniques encouraged collaborative decision-making and helped develop person-centred trusting relationships. Coaches were flexible and responsive to participants' needs and regarded participants as experts in their own lives. Therapeutic alliance was also strengthened by consistency in the coaching format and provision of free activity trackers (Fitbit or simple pedometer). **Conclusions.** The delivery of effective health coaching relies on key techniques which can be learnt and refined in practice. A trusting relationship, deep listening, flexibility in responding to client's needs, and realistic, collaborative goal setting are important aspects that can empower older people to increase and maintain levels of physical activity.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Associations between gardening activity and sleep quality, moderating roles of age and sex**

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**Introduction.** Gardening is a form of physical activity that has been shown to have benefits for mental health and wellbeing. As such, it is possible that engagement in gardening may also have benefits for sleep quality, however little previous research has examined this relationship. This study examined the association of time spent gardening with sleep quality, including whether this association is moderated by age and sex. **Methods.** This cross-sectional study used data from 4,197 middle-aged and older adults in the HABITAT study (Wave 5), conducted in Brisbane, Australia in 2016. Participants reported the amount of time they spent gardening in the previous week, which was categorised as 0, 1-149min, 150+ min/week in line with physical activity guidelines. Past-week sleep quality was reported by participants on a 5-point scale and dichotomised as poor/fair and good/very good/excellent. Two-level logistic regression models (accounting for neighbourhood-level clustering) were used to assess associations between gardening duration and sleep quality, adjusting for age, sex, education, household income, living arrangements, work status and moderate-vigorous physical activity. Age (<65/65+) and sex (male/female) were assessed as potential moderators. **Results.** Nearly two-thirds (63%) of participants reported some gardening in the previous week, with a mean duration of 102 min (sd=197.3). Two thirds (65%) of participants reported their sleep quality to be at least ‘good’. Analyses for the whole sample showed that gardening for at least 150 min/week was associated with higher odds of reporting good/very good/excellent sleep quality (OR=1.23, 95% CI: 1.03, 1.48). When models were stratified by age and by sex, findings were only significant for those under 65 years (OR=1.34, 95% CI: 1.07, 1.68) and for females (OR=1.40, 95% CI: 1.10, 1.79). **Conclusions.** Gardening may be beneficial for healthy sleep, particularly amongst middle-aged adults and women. This supports a growing evidence base of the health and wellbeing benefits of gardening. Further research, particularly with longitudinal designs, is needed to understand the causal pathways and identify the gardening activities and intensities that may be most beneficial for sleep and other aspects of health.
**Conflict of Interest.** The authors declare no relevant conflict of interest for this work.

**Apathy and fatigue, but not depression, associated with physical inactivity in older adults**

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**Introduction.** Long-term improvements in physical inactivity and other behavioural risk factors are crucial to tackle global burden of disease. However, sustained behaviour change is challenging. Affective symptoms such as apathy, depression and fatigue may impact engagement in health behaviours, in line with emerging theoretical frameworks on affective determinants. However, differentiating these symptoms is clinically challenging, as their presentation overlaps. This study investigates whether apathy, depression and fatigue symptoms are differentially associated with multiple health behaviours. **Methods.** In 1,037 community-dwelling older adults without dementia (aged 70-90, 55% women), self-report assessments included health behaviours (physical activity, dietary intake, alcohol consumption, smoking). From these, a composite behavioural risk index was computed, by summing presence of risk factors as per Australian guidelines. Measures of apathy and depression were derived from Geriatric Depression Scale, and fatigue from Assessment of Quality of Life-2. Regression analyses investigated associations of apathy, depression, and fatigue with firstly, individual health behaviours, and secondly, the risk index (measured as one, two or three/four risks; zero referent). Covariates were socio-demographics, cognition, health conditions and APOE4 status. **Results.** Apathy and fatigue were associated with lower physical activity. Apathy explained almost 7% of variance, equivalent to two hours less physical activity per week (weighted by intensity). Additionally, apathy and fatigue were associated with alcohol consumption, and higher odds of multiple behavioural risk factors (compared to zero). Unexpectedly, depression had no association with individual health behaviours, and linked to modestly lower odds of having one risk factor. **Conclusions.** Apathy and fatigue, but not depression, likely act as barriers to engaging in physical activity, and are associated with lifestyle risks. Addressing these symptoms may help support long-term engagement in health promotion activities by older adults. Findings highlight the importance of distinguishing depression from overlapping symptoms, which may otherwise confound evidence on the role of depression in physical activity and other health behaviours.
**Conflict of Interest.** The authors declare no relevant conflict of interest for this work.

## Strength & Conditioning II

**Automatic assessment of resistance training movement performance using template-based modelling**

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**Introduction.** Previous research has used artificially intelligent techniques to autonomously analyse resistance training (RT) movements. Such models classify movement performance, identifying the presence or absence of technical errors. While machine learning (ML) is the most common method for classifying RT movement, alternative techniques, such as template-based (TB) modelling, have been assessed in rehabilitation settings. Therefore, this study aims to develop a novel TB model for classifying the barbell back squat and deadlift movements. **Methods.** A cross-sectional study design was adopted. 61 resistance-trained participants (age: 26.2 (3.1) years, mass: 78.2 (13.2) kg) performed a maximal and submaximal RT protocol for the barbell back squat and deadlift movements. Movement data was captured using two Azure Kinect cameras. Kinematic analysis was performed using estimated joint centre locations from Azure Kinect depth imaging. A strength and conditioning expert examined video footage of the movements and identified the presence of predefined technical errors (e.g., dynamic knee valgus). Individual TB classifiers were developed for the predefined technical errors for each movement. The TB model classified data by comparing it to a "correct" movement template. The template, defined by waveforms (e.g., knee flexion angle) from correct movement performances, identified whether data is "correct" or "incorrect" based on their similarity to the template. Kinematic data and expert marking were used to train and test the classifiers using cross-validation. For comparison, a ML classifier was developed using the LASSO logistic regression algorithm. Evaluation metrics (weighted accuracy, sensitivity, and specificity) quantified classification performance. **Results.** The TB model produced mostly good/moderate prediction performance (weighted accuracy: ~60%-70%). TB model results were comparable to the ML model although the LB model was consistently better (e.g., weighted accuracy was mostly >70%). **Conclusions.** The proposed TB model offers a comparable alternative to ML models for providing autonomous movement feedback. This may allow for the exploration of alternative AI techniques to ML. Future models developed for monitoring movement performance, for RT or other purposes, can benefit from the performed work.

**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Coach and athlete perceptions of periodised strength and conditioning for short sprinters

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**Introduction.** Athletes' training plans are periodized by coaches in order to develop the various conditioning components required for the sport. Little research has been conducted on the perceptions of coaches and athletes associated with these programmes, causing a gap in the literature. Therefore, this study aimed to assess coach and athlete perceptions of a periodized strength and conditioning (PSC) programme for track and field short-sprint athletes during a 24-week periodized training programme. **Methods.** With institutional approval, ten (n= 10) short-sprint athletes and six (n= 6) of their coaches, who participated in PSC training, answered the longitudinal questionnaires on five separate occasions at the beginning and the end of each training phase (mesocycle). **Results.** Both the athletes' and coaches' questionnaires were considered reliable since Cronbach's alpha coefficient for all the variables was above the cut-off value of 0.7. PCA revealed 2 and 4-component models for athletes' and coaches' perceptions with eigenvalues over 1, explaining 44.003% and 14.88% of the total variance, respectively. Statistical differences between the pre and all other time points were noted for athletes' perceptions of the PSC programme's influence on overall performance, skill, strength, speed, power, and understanding of the PSC monitoring protocols. Coaches' perceptions were statistically different from pre to post-mesocycles for all variables. The questionnaire revealed that perceptions of overall performance are influenced by perceptions of strength, skill, power, and speed. The second showed that aerobic and anaerobic endurance and speed are all highly correlated. Finally, the third revealed that athletes' understanding of the PSC programme increased with the return of data. **Conclusions.** Overall, perceptions of the PSC programme's ability to influence the components assessed by the questionnaire were positive, ranging from no different to much better for coaches and athletes. This study indicates that the PSC programme is a fully applicable method for short sprint athletes. Therefore, the PSC programme for short-sprint athletes seems to be a beneficial model for enhancing athletes' and coaches' perceptions of certain aspects of performance.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Effects of three different velocity-based training regimens on deadlift performance in collegiate male and female soccer players

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**Introduction.** Velocity-based training (VBT) has gained recognition as a practical alternative approach to prescribe training intensity compared to percentage-based methods. A major advantage of VBT is the instantaneous feedback provided to practitioners and athletes regarding movement velocity on each repetition. However, the effects of different velocity prescriptions are still being researched. Therefore, this study investigated the effects of three different VBT regimens on submaximal and maximum effort deadlift performance. **Methods.** A parallel group repeated measures design was used. Twenty three male (n=9) and female (n=14) collegiate soccer players (age: 20.4±1.8 years, height, 172.6±13.1 cm, body mass: 68.4±13.2 kg, Deadlift 1RM: 115.8±34.0 kg, to body mass ratio: 1.68±0.19 AU) were randomly assigned into either progressive VBT (PVBT) (4-week strength block [0.45-0.70 $m \cdot s^{-1}$] followed by a 3-week power block [1.0 $m \cdot s^{-1}$]), daily-undulating VBT (DUVBT) which alternated between a strength session and power sessions on a daily basis or optimum training load (OTL) which trained at 1.0 $m \cdot s^{-1}$ for the entire training period. Deadlift 1RM and peak power output (PP) and average concentric velocity (ACV) at weights corresponding to 40%-120% of body mass were assessed on the criterion lift at week 0 and after 7 weeks of training. **Results.** There was a main effect of time for 1RM, indicating a similar increase across all the experimental groups ($p<0.01$, $\Delta\%=12.8\%$). PP displayed a significant group x time interaction where DUVBT ($\Delta\%=23.6\%$) and OTL ($\Delta\%=45.2\%$) changed significantly over time ($p<0.01$), but PVBT ($\Delta\%=16.7\%$) did not ($p=0.08$). Similarly, main effect of group x time ($p<0.01$) was found for ACV, where DUVBT ($\Delta\%=20.5\%$) and OTL ($\Delta\%=30.9\%$) changed significantly over time ($p<0.01$), but PVBT ($\Delta\%=10.8\%$) did not ($p=0.16$). **Conclusions.** Our main findings suggest that all three VBT regimens demonstrated similar adaptations on deadlift maximal performance in collegiate soccer athletes during an off-season mesocycle. However, for submaximal performance, training regimens with faster movements seem to be more beneficial for peak power and concentric velocity adaptations.
**Conflict of Interest.** The authors declare no relevant conflict in relation to this work.

# Female Athletes

### The acute effect of wearable resistance placement on change of direction performance in elite netball players

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**Introduction.** The aim of this study was to determine the acute effects of wearable resistance forearm (WRf) loading versus shank (WRs) loading on change of direction (COD) performance in netball athletes. **Methods.** Ten elite female netball athletes (age: 24.9 ± 5.0 yrs, height: 180.1 ± 6.5 cm, weight: 81.3 ± 15.0 kg) participated in this within-subject repeated measures study under three conditions: (1) no load (NL), (2) WRs, and (3) WRf, both wearable resistance conditions loaded with 1% body mass on each limb. Athletes performed a modified 5-0-5 COD test with additional timing splits and inertial measurement units placed in their shoes. **Results.** Total time was longer for both WR conditions compared to NL ($p < 0.05$, ES = 0.22 – 0.25). The greatest differences between WRs and WRf as compared to NL were in the acceleration phase (0-2m) ($p < 0.05$, ES = -0.67 – 0.79). Both loading conditions significantly affected peak deceleration (ES = 0.56 – 0.82) and maximum speed (ES = -0.50 – 0.60). No significant between WR conditions differences were observed. **Conclusions.** It appears that WRs and WRs acutely affect COD performance and therefore can be used as a potential method to improve COD performance over a long period of time, the choice of overload dependent on the musculature that needs training.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### The Low Energy Availability in Female Questionnaire (LEAF-Q) in identifying health markers in elite female rugby 7s players

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**Introduction.** The purpose of this research project was to determine whether a risk score indicative of Relative Energy Deficiency in Sports (RED-S) on the Low Energy Availability in Female Questionnaire (LEAF-Q) predict health markers associated with RED-S amongst elite female rugby 7s players. **Methods.** A total of 14 elite female rugby 7s athletes from New Zealand completed a LEAF-Q alongside a food diary, provided blood samples and underwent a DEXA scan. The difference in dietary intake, blood markers (ferritin, triiodothyronine, high sensitivity C-reactive protein) and body composition between LEA risk (at risk ≥8, not at risk <8 on the LEAF-Q) was analyzed using an unpaired t-test, with Bonferroni correction p value of <0.025 to detect significant difference. **Results.** In 2018, 50.0% of the participants were classified as at risk of LEA. In 2019, 57.1% were classified as at risk of LEA. The injury history of the elite female rugby 7s players heavily influenced the risk score. When comparing dietary EI between the two groups, those at risk in 2018 had intakes significantly lower than those not at risk (8836 (1789) vs 11003 (2266) kJ/day, respectively, $p = 0.009$). Carbohydrate intake relative to body mass in 2018 was significantly lower in those at risk (3.1 (0.7) vs 4.0 (1.1) $g \cdot kg^{-1} \cdot day^{-1}$, respectively, $p = 0.023$). There was no significant difference detected between LEA risk and body composition or blood markers measured at either timepoint nor was there a difference in dietary intakes in 2019. **Conclusions.** A weak link is revealed between risk score on the LEAF-Q and health markers associated with RED-S. Considering the influence of injury history on the risk score, using the LEAF-Q may not be appropriate to categorize LEA risk amongst elite female rugby 7s players. Therefore, measuring components of energy availability to identify players at risk of LEA may improve the prediction of health markers associated with RED-S.
**Conflict of Interest**. The authors declare no relevant conflict of interest in relation to this work.

### Influence of the menstrual cycle and body image on female athlete experiences

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**Introduction.** Exploring body image and the menstrual cycle through a feminist lens, by asking female athletes about personal experiences and how they perceive these may have played a part in their sport development and experience. Currently, female athletes feel greater pressures to conform to 'ideal' body standards than men and are likely to follow

training principles and be provided with coaching strategies based on male 'norms' often resulting in avoidable poor health and performance outcomes. **Methods.** This study interviewed eight regularly active, menstruating females aged between 25 and 39 from a variety of sports and competition levels. Semi-structured interviews were used to capture experiences of the menstrual cycle and body image and how participants believed those experiences influenced their sport experience and careers. A thematic analysis was used to understand the collected data and generate themes. **Results** Four main themes were identified from the thematic analysis: 1) body image perceptions and experiences; 2) impact of body dissatisfaction; 3) menstrual cycle experiences; and 4) sports environments for female athletes. 9 sub-themes were also identified within the main themes. **Conclusions.** There was strong evidence that a women's perception of body image is influenced by the sporting environment experienced and that a woman's experience of sport can also be shaped by her body image. It was clear that experiences of the menstrual cycle, body image and sport were heavily related and therefore worth being considered in future female-specific coaching strategies. Recommendations are intended to help athletes, coaches, parents, etc. to enhance the experience of females in sports in relation to body image and the menstrual cycle.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

# Strength & Conditioning III

### Strength and power adaptations after a 4-week undulating periodization emphasising long eccentric or concentric durations in rugby sevens players

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**Introduction.** Strength training at slow tempos (longer time under tension) provides additional mechanical stimuli that may allow for optimal strength development. This study investigated the effects of 4 weeks of strength training emphasising either long-eccentric or long-concentric duration on strength, power, and speed development. **Methods.** Sixteen national-level male rugby 7s players (21.6±2y) trained twice a week for 4 weeks with either 5-0-2-0 (eccentric-emphasis, ECC) or 2-0-5-0 (concentric-emphasis, CON) exercise tempo. Exercises included back squat, bench press, Romanian deadlift, military press, and leg press with the loads increasing every week (undulating scheme). Maximal back squat strength (eccentric and concentric), bench press, countermovement jump (CMJ), drop jump, single and repetitive horizontal jumps, 40m sprint, and 505 agility were recorded pre- and post-training. **Results.** Improvements were observed in back squat (ECC: 17±12kg, 11%, $d$=0.68 *moderate* effect; and CON: 12±9kg, 9%, $d$=0.50 *small*); eccentric back squat (ECC: 24±14kg, 13%, $d$=0.94 *moderate*; and CON: 19±10kg, 10%, $d$=0.68 *moderate*); and bench press (ECC: 8±4kg, 8%, $d$=0.50 *small*; and CON: 7±3kg, $d$=0.56 *small*, 7%), without between-group differences ($p$>0.05). Also, CMJ peak power and height, and drop jump contact time showed improvements (ECC: $d$=0.68-0.90 *moderate*; CON: $d$=0.02-0.33 *trivial-small;* $p$<0.05). No within- or between-group changes were observed in other jumping parameters, 40m sprint, or 505 agility. Pre- and post-intervention, relationships existed between lower-body strength (relative squat or eccentric squat) and several explosive and athletic tasks: e.g., CMJ peak power ($r$=0.639), 3-double-legged jumps ($r$=0.629); and 505 agility ($r$=0.573); as well as sprint performance: e.g., 20m, 40m, and 10-30m flying ($r$=0.570-0.730), but only at post-intervention. Covariance was observed between relative squat strength and acceleration ($r$=-0.835). **Conclusions.** Short-term eccentric-emphasis training appeared marginally superior to concentric-emphasis training for lower-body muscular strength gains. Both eccentric and concentric strength appears to underpin various high-speed, athletic abilities.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Automatic assessment of resistance training movement performance using machine learning

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**Introduction.** Previous research has combined portable data collection techniques with machine learning models to autonomously analyse resistance training (RT) movements. Such models classify movement performance, identifying the presence or absence of technical errors. However, previous classification models adopted poor developmental techniques,

provided un-insightful movement feedback, or were not usable in real world settings. This study aims to overcome these limitations and address whether the proposed framework can accurately classify common RT movements. **Methods.** A cross-sectional study design was adopted. 61 resistance-trained participants (age: 26.2 (3.1) years, body weight: 78.2 (13.2) kg) performed a maximal and submaximal RT protocol for the barbell back squat and deadlift movements. This included a three-repetition maximum followed by additional sets at lighter loads. Movement data was captured using two Azure Kinect cameras. Joint centre locations were estimated from captured depth imaging and were used for kinematic analysis. A strength and conditioning expert examined video footage of the captured movements and identified the presence of predefined technical errors (e.g., dynamic knee valgus). Individual classification models were developed for the predefined technical errors for each movement. Each classifier utilised the LASSO logistic regression algorithm. Kinematic data and expert marking were used to train and test the classifiers using cross-validation. Evaluation metrics (weighted accuracy, sensitivity, and specificity) quantified classification performance. **Results.** Many of the developed classifiers predicted the presence of their technical error with good levels of accuracy (>70%). Few presented poor levels of accuracy (50-60%). Accuracy was higher for the barbell back squat compared to the barbell deadlift. Classifiers examining technical errors in the sagittal plane (e.g., spine flexion) outperformed frontal plane classifiers (e.g., dynamic knee valgus). **Conclusions.** Compared to previous work, the developed classifiers performed comparably or superiorly with predominantly good levels of prediction accuracy (>70%). Furthermore, the proposed framework provides greater insight into movement performance and applicability to real world settings. Future models developed for monitoring movement performance, for RT or other purposes, can benefit from the performed work.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

## Multidimensional approach to monitoring player performance, fatigue, and wellbeing with international rugby players

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**Introduction.** There are 5 main components with this research project. Some aspects related to data already being collected for Tongan rugby players by the support staff, and the research team gained approval with access to this data. **Methods.** Additional components were also included. **(1) On-field tracking.** Rugby players had all on-field training/games tracked via a global positioning system (GPS) device (Catapult Sports, Melbourne, Australia). These devices recorded movement and enabled a number of different variables to be reported (i.e., total distance, average speed). These devices are widely used in team sport and data was collected throughout training sessions matches. The device is housed within the rugby jersey between the shoulder blades. The methods for data collection were as per normal monitoring procedures used in field-based team sports. As such players were not being asked to complete any additional tasks associated with this data collection. Data was collected and stored in an identifiable form (i.e., names). Coaching staff of the Tongan rugby team were able to identify players, which is the normal practice using GPS systems for tracking player demands. As such players will be able to be identified. For research purposes, the research team de-identified the data prior to analysis and stored in a coded form. **(2) Neuromuscular performance testing.** Players performed a countermovement jump as a measure of lower limb power and this is used in team sport to monitor neuromuscular fatigue in a quick, non-invasive manner. Testing involved performing a maximal effort counter-movement jump (CMJ) on a force plate (Vald performance, Brisbane, Australia). Testing occurred in the mornings (generally around 0800h) in conjunction with team meetings. Players were asked to complete 3 maximal effort jumps with approximately 30s rest between jumps. As per GPS data, performance scores were recorded in an identifiable form for the purposes of player monitoring procedures. For research purposes, the research team de-identified data prior to analysis and will be stored in a coded form. **(3) Fitness testing scores.** Rugby players often undergo various fitness testing such as strength testing, 20m sprint, and cardiorespiratory endurance tests. The research team gained access to data (from January 1, 2023 to end of Rugby World Cup) collected as part of normal team fitness testing procedures. No additional tests were imposed by the research team. Data will be provided by Tongan rugby to the research staff, in a coded (de-identifiable) format. **(4) Sleep monitoring.** Sleep was monitored via wrist-worn accelerometers and self-reported sleep and wake times using a sleep diary across the season (see Daily wellbeing below). Sleep monitors were worn by select players (n=~20) from a variety of playing positions when they go to bed at nighttime. Other sleep opportunities (i.e., airline travel, naps) will not be collected**. (5) Daily wellbeing**: Daily monitoring procedures are commonly utilised in elite sport whereby players respond to a series of questions related to their physical well-being and recovery to training and matches. Each day, players were required to respond to the following questions, and rate them on a 5-point Likert scale (1 representing a low or poor rating, and 5 representing a high or good rating): Muscle soreness; Sleep quality; Fatigue level; Stress; Motivation. In addition, players recorded what time they went to bed and tried to go to sleep, and what time they woke up each morning (to the nearest 10 minutes). This data was aligned with sleep monitoring data for data analysis. Players will complete the questionnaire on their own smartphone device, with the survey administered daily, via the Smartabase program (Fusion sport). **Results / Conclusions.** Players had their own individual login, and the research team was provided with coded (re

identifiable data) from Smartabase.
**Conflict of Interest**. The authors declare no relevant conflict of interest in relation to this work.

### Bone health: A focus on jump landings for women

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**Introduction.** The primary purpose of this study was to determine the effects of a 12-month quantified jump-landing program at clinically relevant bone sites in premenopausal women. Secondary measures of interest included; lower body explosive power, muscle reactivity, balance performance parameters and body composition. **Methods.** A longitudinal controlled trial was implemented to determine the effect of utilizing previously quantified jumps and hops with specific cues provided for jump-landings. Participants; Fifty-seven women (age, 42.4 ± 5.50 y; body mass, 70.2 ± 11.5 kg; height, 165.4 ± 0.10 cm; body fat, 31.5 ± 6.20%) were assigned to a jump (JL) or control (CON) group. The JL performed periodized jumping-landing exercises up to five times per week for 12-months. **Results.** Significant group main effects ($P<0.01$) in favour of the JL (↑0.41 - ↑3.72%) were observed for bone mineral density and bone mineral content at the femoral neck, total hip and lumbar spine. Significant group main effects ($P<0.01$) for cross-sectional area, cortical thickness and section modulus at the femoral narrow neck were also in favour of the JL (↑2.78 - ↑3.84%). For ground contact time, improvements in the JL over the CON between baseline and 12-months were apparent (↑21.9% vs. ↓8.86%) with significant group and time effects ($P<0.01$) being observed. **Conclusions.** A longitudinal quantified periodized jump-landing program performed 2-3 mins/day; 4-5 times a week is osteogenically effective in improving bone strength at clinically relevant lower body sites associated with osteoporosis in premenopausal women. The practical significance of these findings is that relatively safe exercises such as those utilized in our osteogenic exercise program, achieve pre-requisite osteogenic thresholds and as such can be used by premenopausal women in their own homes (once competent with the jump-landing technique) to improve bone health, providing a firm surface is utilized. The findings from this research will inform the development of preventative interventions for premenopausal women and represent a "window of opportunity" to prevent or delay the time before the fracture threshold is surpassed in the postmenopausal years, during a period of lowered fracture risk.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

## Injury

### User perception and acceptance of softshell headgear amongst youth rugby players

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**Introduction.** This study investigated the attitudes of youth rugby players towards the use of protective softshell headgear during rugby training and matches. The primary objective was to gain insights into their preferences and concerns regarding headgear. The innovative aspect of this research lies in its focus on youth rugby players and their perceptions of headgear, which is one of the crucial aspects of player safety. **Methods.** A survey was administered to 43 high school-level (Years 9-13) rugby players (females aged 13-17 and males aged 14-16 years). The survey aimed to assess players' attitudes towards headgear. The participants were asked questions regarding their use of headgear during training sessions and matches, previous use of headgear, reasons for discontinuing its use, and headgear brands they have worn. Additionally, those who wore headgear were asked about their motivations for using it, while those who did not wear headgear were questioned about their reasons for not doing so. Participants' confidence in their head protection without headgear, head injuries experienced, familiarity with headgear specifications, and awareness of information about headgear benefits and risks were also examined. **Results.** Among the participants, the majority (37 players), did not wear

headgear during training sessions, with 3 using it occasionally and 3 using it consistently. In matches, 32 did not wear headgear, 3 used it occasionally, and 8 used it consistently. Of those who previously wore headgear but stopped, reasons included discomfort, a perception that headgear was ineffective, and that headgear restricted mobility. Various brands of headgear were reported to be used, CCC (Canterbury of New Zealand), not World Rugby Approved, was the most common (12) followed by NPro (World Rugby Approved) (9). For those who wore headgear at any stage, the primary reasons (chosen from any of ten options) included parental advice (78%) and protection from head injuries (52%). The main reasons for not wearing headgear were lack of ventilation (67%), headgear was bulky/annoying (50%), general discomfort (44%), and headgear use not being compulsory (36%). Additionally, 19 participants believed that headgear offers protection against potential head injuries, 13 were unsure, and 11 believed that it did not offer protection. **Conclusions.** The results of this study indicate a range of attitudes among youth rugby players towards the use of headgear. Understanding their motivations and concerns is crucial for improving player safety. While some players see headgear as a valuable protective measure, others are deterred by factors such as discomfort and lack of ventilation. There is a need for greater awareness and education about headgear benefits and risks among rugby players, potential modifications to headgear design to enhance comfort and ventilation should be explored.
**Conflict of Interest.** The author declares no relevant conflict of interest in relation to this work.

### Incidence and magnitude of head impacts experienced by female adolescent rugby players across a season of rugby participation

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**Introduction.** There is growing concern regarding the safety of rugby union players and ongoing medical problems following a concussion and/or long term participation in rugby union. However research on females and adolescents is sparse and recent changes to rugby union rules are based off elite or varsity level athletes. Adolescent female rugby players have a different anatomy and game demands, placing them at greater concussion risk compared to male players. Investigation of sex and age-specific impact magnitude and incidence of head impacts is required to help improve the safety of female adolescent rugby players and to increase our understanding of how these impacts affect ongoing brain health. **Methods.** Across the 2022 rugby season Eighteen U17 female rugby players aged 12-17 years completed pre-season and post-season-assessment including: (i) 3T advanced magnetic resonance imaging, (ii) neurocognitive testing (NIH toolbox), (iii) health history questionaire, (iv) motor control questionnaire. During the season participants wore an instrumented mouthguard (recording linear and angular accelerations above 8g) for all school and club games and contact training sessions which were videoed in order to verify all mouthguard detected impacts. **Results.** One seasons of female collision magnitude and incidence data will be presented. Average total incidence per team was 23 at training and 75 for games. Average peak linear acceleration (PLA) was 21.1 g at training and 21.6 g at games, the total seasonal average was 21.4 g. The largest impact for the season was 96 g. **Conclusions.** The study highlights the need for sex and age specific, objective data to measure head impact exposure in rugby union. Monitoring head impact size and seasonal load is important for rugby safety and understanding the impact of concussive and non-concussive impacts in rugby. We provide insight into head load of female adolescent rugby players across a season of club and school rugby game and trainings.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Netball players' overall sporting load and injury incidents: Comparison of 2019 and 2022 secondary school championships

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**Introduction.** Netball players aged 10-19 are at a higher risk of ankle and knee injury. Netball New Zealand guidelines recommend playing on a maximum of three netball teams and only participating in one other sport per season to reduce the risk. The study examined netball players' sports participation and injury profile at the New Zealand Secondary Schools Championships in 2019 and 2022. **Methods.** Sports participation and injury incident data were collected on players competing in the New Zealand Secondary Schools netball tournament in 2019 (n = 157) and 2022 (n =132). A two-sample independent T-test was used to compare the two years. **Results.** Netball players mostly participate in two ($p = 0.52$) or three ($p = 0.81$) teams annually. Summer and winter sports participation can overlap in March and October. In 2022, more netball players were involved in other sports similar to netball compared to 2019 ($p < 0.05$). In 2022, the number of player injuries was similar to that of 2019 ($p = 0.27$). Ankle injuries are the most prevalent, followed by knee (including

ACL) and shin injuries. **Conclusions.** Players adhere to the recommendations of not playing in more than three netball teams per season. Multiple sports participation may overlap summer and winter sports during March and October. Players are involved in sports with similar physical loads, which can increase the risk of lower limb injuries. Ankle, knee, and shin injuries are the most prevalent in netball. Netball players follow the advice to limit playing in multiple teams but still face high injury rates. More work is needed to understand the correlation between player load and injuries.
**Conflict of Interest.** Netball New Zealand employs the first author.

### The association between oculomotor performance and neck muscle function in driving: A narrative review

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**Introduction.** This article aims to review the relationship between oculomotor performance and neck muscle function and better understand how these systems typically interact during automobile driving. Additionally, this review seeks to identify any areas that require further research to enhance driving safety and performance. **Methods.** The research methodology involved the implementation of a search strategy, identification of inclusion and exclusion criteria, selection of relevant studies, and summarising the findings. Throughout this paper, we present a narrative review of the existing literature related to the oculomotor nerve and eye-tracking systems, as well as neck muscles and the head control mechanism. **Results.** This narrative review draws from 28 relevant sources and suggests that training programs focusing on improving head-eye coupling can effectively enhance drivers' visual perception and decision-making skills, as well as maintain the stability and balance of the head and neck during high-speed manoeuvres. Additionally, a comprehensive assessment of sensorimotor function, including postural balance, neck proprioception, and eye movements, is necessary for diagnosing and treating individuals with driving injuries. This assessment is essential for developing appropriate rehabilitation and management strategies. **Conclusions.** Motorsports is a dynamic and demanding environment with a high incidence of neck injuries. Studies have linked neck function and oculomotor performance, but more research is needed in the field of motorsports. For example, the vestibulo-ocular reflex (VOR) contributes to integrating the movement of the eyes with the neck, crucial for stabilizing visual perception. Oculomotor assessment can be used following injuries, such as concussion or whiplash, to evaluate visual performance. This can aid in early diagnosis and the development of targeted rehabilitation to optimise their performance on the road. Investigation into the performance of elite motorsport athletes compared to ordinary drivers of different ages and genders is needed. Valid and reliable equipment is also essential for research on high-speed environments. Understanding is needed in how oculomotor performance and neck muscle function are affected by visual stimulus, body position, and Head and Neck supports. Studying these differences can improve driver training, control head and neck impact events, and reduce injuries. Ultimately, a comprehensive approach that considers the interplay between oculomotor performance and neck muscle function is necessary for optimal driving performance and safety.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

## Exercise Physiology II

### Predicting responses to a heat acclimation protocol in trained triathletes

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**Introduction.** Heat acclimation (HA) is a well-researched, fundamental training tool for athletes preparing to compete in environments where the ambient temperature is significantly different to the environment in which the athlete regularly trains. Not every athlete responds equally to HA protocols, with noticeable non-responders seen frequently. This research attempted to create a model in which the response to a long-term HA protocol could be predicted from a heat response test (HRT) and training monitoring. **Methods.** Ten triathlete participants (33.6 ± 10.6 years, 8 males and 2 females; $\dot{V}O_{2PEAK}$ 56.9 ± 11.1 $mL \cdot kg^{-1} \cdot min^{-1}$) completed a 14-day cycling-based HA protocol (36 °C, 50% relative humidity). Adaptation was determined by two heat response tests (20-minute steady state followed by 30 km time trial) that book-ended seven HA sessions. Measures of sweat composition, sweat loss, haemoglobin, rectal temperature, and thermal impulse were used to retrospectively predict HRT2 performance. **Results.** The HA protocol was successful in inducing performance improvements (74 s; Cohen's $d$ = 1.40 (0.03, 2.83); $p$ = 0.0374). Of the other thermoregulatory markers,

none were significantly changed in response to the HA protocol. Reverse stepwise regression analysis was used to construct two models: 'best overall fit' which was informed by all variables collected, and 'best practical fit', which was informed only by data attained in HRT1. The 'best' model accounted for approximately half of the variation in performance improvement ($R^2$ = 0.53, p = 0.017), which was similar to the variance explained by the 'best practical' model ($R^2$ = 0.49, p = 0.023). A combination of low baseline $VO_{2PEAK}$, large sweat loss, and high sweat sodium concentration during HRT1 correlated with greater performance improvements. **Conclusions.** Performance can be moderately predicted by responses to an initial HRT. Measuring baseline $VO_{2PEAK}$ prior to an HA protocol and recording sweat loss and sweat sodium during an initial heat response test can provide practitioners with ~50% accuracy in predicting potential performance improvements seen in an HA protocol in trained triathletes.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Effects of systemic versus local hypoxia on post-activation potentiation in elite field hockey players**

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**Introduction.** Post-activation potentiation (PAP) is based on the idea that a maximum/near-maximum muscle contraction (called conditioning activity, CA) stimulates the body to produce even greater strength/power production in subsequent exercise. Traditionally, CA is plyometric exercise however, recently blood flow restriction and systemic hypoxia have also been used. It is thought hypoxia either from breathing hypoxic gas or from reduction in blood flow to the muscle in BFR may result in fatigue to oxidative slow-twitch-fibres, thus triggering recruitment of fast-twitch-glycolytic-fibres and therefore improved muscular force and power. Since both plyometric exercise and systemic or local hypoxia may result in a PAP effect we wanted to investigate whether combining these stimuli would enhance PAP effect. Also, how long the PAP effect lasts is controversial so a secondary aim was to examine the change in PAP over time. **Methods.** Fourteen elite field hockey players (19.1±1.2years;75.4±9.3kg;177.2±7.4cm) (4females and 10males), voluntarily participated in this cross-over study and randomly applied each of 5 conditions. HYP:hypoxia, NORM:normoxia, BFR:blood flow restriction, $PLC_{HYP}$:placebo for hypoxia, $PLC_{BFR}$:placebo for BFR. The exercise program consisted of 1x5 drop-jumps (DJ), 1x5 countermovement-jumps and, 1x5 single-leg horizontal-jumps. Hypoxia was applied under normobaric conditions at $SpO_2$of 87% with a face mask attached to a hypoxic generator. BFR was applied with a cuff positioned around the upper thigh with a pressure set to 50% of predicted individual arterial occlusion pressure. The placebo conditions were the same set-up but without hypoxia and with 15-20%cuff pressure. To test for the PAP effect we had subjects complete a DJ at baseline and at 3, 6, 9, 12, 15 and 18min after the CA exercise. **Results.** We found a significant interaction between time and condition on DJ height($p=0.029$) and flight time($p=0.031$). Jump height and flight time increased significantly at 18min (32.3±5.9cm;511.5±46.8ms) compared to 3min (29.5±4.2cm;489.6±34.2ms) and 6min (29.9±5.2cm;491.8±42.2ms) for HYP; at 18min (31.9±5.5cm;508.0±44.8ms) compared to 15min (30.5±5.2cm;496.8±42.6ms) for $PLC_{BFR}$; and at 3min (31.9±4.9cm;508.6±39.2ms) compared to 12min (29.9±4.5cm;492.8±37.9ms) and 15min (29.8±5.8cm;490.6±48.3ms) for BFR($p<0.05$). **Conclusions.** While the same plyometric protocol in normoxia conditions has no PAP effect, we found jump performance improvement after a CA, early with only BFR and late with systemic hypoxia and low-pressure-BFR. These are preliminary data, and we would require more testing on further subjects to substantiate these findings.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work. This study was granted by TUBITAK (The Scientific and Technological Research Council of Turkey) (No: 1059B191900892).

**Enhancing cognitive function and reducing mental fatigue: The impact of acute cocoa flavanol supplementation in severe hypoxia**

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**Introduction.** Hypoxia impairs brain function and lowers performance and safety at high altitude. Supplementation with flavanol-rich cocoa (FRC) can increase abundance of the vasodilator nitric oxide and improve cerebral hemodynamics. This study tested the hypothesis that acute cocoa flavanol supplementation protects cognitive functions during severe normobaric hypoxia. **Methods.** A randomized, double-blind design was used to compare flavanol rich cocoa (FRC) with placebo (PLA). Twelve healthy participants (7 male; mean age 26.1 (6.2) years) consumed 15 $mg.kg^{-1}$ of FRC or PLA capsules 90 minutes before completing a cognitive test battery, during normoxic conditions and then normobaric poikilocapnic hypoxia equivalent to 5500 m altitude (partial pressure of end-tidal oxygen ($P_{ET}O_2$) = 45 mmHg). Middle cerebral artery blood velocity (MCAv; transcranial Doppler), cerebral oxygenation (functional near-infrared spectroscopy) and the partial pressure of end-tidal carbon dioxide ($P_{ET}CO_2$) were measured. Data are presented as mean

(SD). **Results.** Hypoxia impaired an overall cognitive function score, but the impairment was lower with cocoa flavanols than placebo (normoxia placebo 101.2 (7.5); hypoxia placebo 88.9 (9.2); normoxia flavanols 102.9 (7.6); hypoxia flavanols 92.8 (12.4), main effect of flavanols $p = 0.03$). MCAv increased similarly from normoxia to hypoxia in both FRC (52 (7) to 63 (18) $cm.s^{-1}$) and PLA (53 (9) to 62 (14) $cm.s^{-1}$), despite $P_{ET}CO_2$ being similarly reduced (FRC, −3.7 (4.1) mmHg; PLA, −4.5 (3.9) mmHg). Total haemoglobin was greater with flavanols than placebo during hypoxia (6 µmol vs 0.8 µmol, $p \leq 0.05$) and the hypoxia-induced reduction in cerebral oxygenation with placebo was twice that with flavanols. **Conclusions.** Cocoa flavanol-mediated improvements in overall cognition during normoxia persist during severe hypoxia. Cocoa flavanols may have utility as a neuroprotective supplement in aviation and high-altitude sports-and-exercise.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### No effects on cycling performance from acute or chronic consumption of New Zealand blackcurrant extract

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**Introduction.** Previous research examining the ergogenic benefits of blackcurrant supplementation (BS) on exercise performance is contradictory. One explanation postulated for this is differences in supplementation dose and BS administration protocol. The BS supplementation period in many positive studies has typically been chronic (>6-days), often with a final dose taken hours before testing. However, whether any observed performance benefits are from the acute dose or the chronic supplementation is unclear. Given the lack of studies examining acute vs chronic blackcurrant supplementation, this study aimed to examine the effects on cycling performance of a single-acute dose and a 7-day supplementation with BS, prescribed at a dose of 4.3 $mg.kg^{-1}$ body weight. **Methods.** This study was a placebo-controlled, double-blind, cross-over trial. Ten males (mean ± SD: age, 35.6 ± 12.0 years; height, 177.3 ± 8.6 cm; weight, 74.0 ± 12.1 kg; $\dot{V}O_2max$ 4.14 ± 0.62 $L.min^{-1}$) and six females (age, 38.3 ± 8.4 years; height, 173.25 ± 4.6 cm; weight, 71.86 ± 13.1 kg; $\dot{V}O_2max$ 3.30 ± 0.45 $L.min^{-1}$) completed a total of six experimental sessions in 2 x 3 treatment blocks (Exp or Placebo) separated by a 2-week washout period. Each treatment block consisted of a no-supplement baseline trial followed by a single dose (acute) and then a 7-day (chronic) supplementation trial. During each trial, subjects completed a maximal incremental test, and 4 km time trial separated by 15 minutes of recovery. Respiratory data, heart rate, muscle oxygenation and performance power were measured continuously in each trial, and differences between treatments were determined using repeated measure analysis of variance (RM-ANOVA) and effect size analysis. **Results.** There was no significant difference ($p>0.05$) in cycling performance between experimental and placebo treatments following acute or chronic supplementation periods. Furthermore, there were no significant effects on measured physiological and metabolic parameters and any observed differences in performance or physiology were deemed trivial ($d<0.2$). **Conclusions.** Blackcurrant supplementation delivered either acutely or chronically over a period of 7 days had no significant effect on cycling performance or physiology. Therefore, we conclude that BS is unlikely to provide any ergogenic benefit to well-trained endurance athletes.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

## Sport & Exercise Psychology II

### Psychological and cardiovascular effects of physical activity indoors and outdoors, a cross-over trial

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**Introduction.** Effects of green exercise on health indices have been extensively reported, yet few studies included physically inactive, middle-aged participants. Affective responses during and after exercise directly influence one's intention to participate again. It is important for middle-aged adults to experience positive affective responses to physical activity, to increase their likelihood of engaging in and maintaining activity, to offset age-related decline in physical and psychological health. *Study purpose:* Compare walking in outdoor (green space) and indoor (secluded gym) environments on psychological and cardiovascular responses in physically inactive, middle-aged adults. **Methods.** Using a randomised crossover design, sixteen healthy, inactive adults (Mean age = 41 (SD 7) years; 9 females) walked for 40 minutes at self-selected intensity on a treadmill indoors and at a local nature reserve outdoors, 7 days apart. Affect, attentional focus,

rating of perceived exertion, remembered affect, heart rate and blood pressure were measured before, during (each 5 min) and after walking. Nature relatedness was measured at baseline. Effects of activity and environment were examined using RM-ANOVA, linear mixed analysis, t-tests, and Pearson correlations. **Results.** Participants chose similar walking intensities indoors (4.7 km/h) and outdoors (4.8 km/h) (average HR 114 bpm and 117 bpm, respectively). Affective responses were more positive outdoors than indoors (p=0.039), as was remembered affect (p=0.001). Attentional focus did not differ between environments (p=0.986). In the outdoor environment, nature relatedness was positively correlated with attentional focus (r=0.636, 95%CI=0.204, 0.860) and remembered affect (r=0.653, 95%CI=0.232, 0.868). Walking decreased systolic blood pressure by 4 mmHg, without significant effect of environment (interaction: p=0.130). **Conclusions.** Walking outdoors yield more positive psychological outcomes than walking indoors, possibly due to a sense of connectedness with nature. Embracing walking in green space as a means to encourage physical activity, could serve as an approach to mitigate age-related decline in physical and mental health, and warrants greater focus for research and health interventions.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Breaking the cycle - investigating the use of motivational interviewing and cognitive behavioural therapy to reduce recurrence of lower back pain: A randomised controlled trial study protocol.**

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**Introduction.** Non-specific low back pain is a common and costly global issue. Many people with low back pain live for years with ongoing symptom recurrence and disability, making it crucial to find effective prevention strategies. Many clinical practice guidelines recommend the use of a biopsychosocial framework to guide management, but the methods for effective delivery of this approach are unknown. Motivational interviewing is a patient-centred counselling style that helps individuals to change their behaviours. In combination with cognitive-behavioural therapy, motivational interviewing may have the potential to yield long term improvements in pain and disability and reduce incidence of recurrence. **Methods.** This is a two-arm superiority randomised control trial comparing MI-CBT and Education (n=83) with Education only (n=83). Participants that are recovered from a recent episode of non-specific low back pain (7th consecutive day with pain $\leq 3$ on a 0-10 numeric pain rating scale) will be eligible for inclusion into the study. Both groups will receive face-to-face sessions of the allocated intervention at 0 and 2 weeks. Thereafter, participants will receive two telecommunication-based sessions at 4 and 8 weeks. Outcomes include the number of participants who report back pain $\geq 3$ out of 10 (numeric pain rating scale) over the next 12-months, and self-reported (1) Pain Intensity; (2) Pain Catastrophizing; (3) Fear-Avoidance Beliefs; (4) Pain Self-Efficacy; (5) Depression and Anxiety; (6) Disability, and will be measured at baseline, 3-, 6-, and 12-months follow up. **Results / Conclusions.** The effective delivery of recommended treatment for low back pain is an important aspect that requires urgent attention. This study will provide new information on the effectiveness of utilizing a motivational interviewing and cognitive behavioural therapy approach to provide education, advice, and exercise therapy to improve low back pain outcomes. Evidence emerging from this trial has the potential to inform clinical practice and healthcare management of non-specific low back pain.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**How do runners select their shoes? An in-store experience**

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**Introduction.** Several factors influence running shoe selection. Previous research on shoe selection has relied on participant recollection through large online surveys and interviews, or experiments without the act of purchasing running shoes. We aimed to identify factors that influence running shoe selection in-store and identify any differences during the shoe selection process between buyers, non-buyers, and salespeople. **Methods.** One-hundred-and-one runners (85 buyers and 16 non-buyers) and 38 salespeople completed surveys in specialty running stores in a cross-sectional design. Non-

parametric tests were used to compare outcomes between groups. **Results.** There were no significant differences between buyers and non-buyers when comparing demographics, shoe selection behaviours, or level of consciousness. Salespeople (27.2 ± 6.9 years) were significantly younger than runners (38.5 ± 12.3 years) ($p < 0.001$). On average, salespeople selected 12 factors that influence shoe choice, compared with only five factors for buyers and non-buyers (Kruskal-Wallis, $p < 0.001$). Salespeople believed they had a greater influence on runners' selection (mean: 80.9 ± 11.8 mm) than buyers (67.7 ± 28.4 mm) and non-buyers (62.6 ± 18.2 mm). Runners most frequently identified fit, comfort, and gait analysis or injury prevention as most influential in selecting shoes, in that order. Buyers and non-buyers prioritised advice on running shoes from salespeople, friends, and family, while salespeople primarily got their information from peers. Both buyers and non-buyers thought about their purchase a similar amount (i.e., consciousness). **Conclusions.** Runners prioritised fit, comfort, and gait analysis in-store, which differs from previous research findings with different study designs. Buyers and non-buyers did not demonstrate significantly different characteristics and behaviours during shoe selection in-store and may represent a similar population within a geographical area. In contrast, salespeople and runners were significantly different in several ways. Runners seek advice primarily from salespeople in specialty stores, which may limit their exposure to evidence-based information. Salespeople are informed by their peers, internal training, and brand representatives, rather than scientific sources. Runners that choose their shoes in store should critically evaluate recommendations made by salespeople.
**Conflict of Interest.** JFE and KHL are speakers for The Running Clinic, a continuing education organisation.

# Biomechanics I

### Ankle starting position influences all calf raise test outcomes

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**Introduction.** Practitioners in health and sport use the Calf Raise Test (CRT) to assess triceps surae muscle strength-endurance. The test involves individuals going up on their toes and back down as many times as possible, standing on one leg. Yet, variations in protocol exist that may influence CRT outcomes and interpretation. We examined the influence of the three most used ankle starting positions on CRT outcomes. We also considered the potential influence of gender, age, body mass index (BMI), and level of physical activity (PA) on outcomes. **Methods.** Forty-nine healthy individuals (59% female, 21±4 years) performed as many calf raise repetitions as possible standing on one leg in three randomised ankle starting conditions conducted on different days: flat (0°), incline (10° dorsiflexion), and step (full dorsiflexion). We used the validated Calf Raise application ($CR_{app}$) to extract the following outcomes: number of repetitions, peak height, total vertical displacement, and total work. Data were analysed using mixed-effects models and stepwise regression. **Results.** There were significant differences in all CRT outcomes based on ankle starting position ($p<0.001$). All paired comparisons were statistically significant ($p\leq0.023$). Repetitions, total vertical displacement, and total work were greatest in flat (28±8 repetitions, 229±70 cm, 1706±608 J) and lowest in step (18±8 repetitions, 159±80 cm, 1165±572 J) conditions. Peak height was greatest in incline (10.86±1.36 cm) and lowest in step (8.44±1.87 cm) conditions. Gender ($p=0.021$; males>females) and BMI ($p=0.002$, lower>higher) significantly influenced the number of repetitions. Gender ($p<0.001$; males>females) also influenced the total work. CRT outcomes were not significantly different based on age and PA. **Conclusions.** Ankle starting position significantly affected all CRT outcomes, which needs consideration when contrasting data in research and practice. Among the predictors, gender and BMI influenced the number of repetitions and total work, whereas age and PA did not likely due to homogeneity in our sample. The flat or incline conditions appear more ideal for standardisation than the step, as greater peak heights (i.e., heel displacement) were achieved in the former conditions.
**Conflict of Interest.** One of the authors is the developer of the free-to-use $CR_{app}$.

### Biomechanical risk factors associated with anterior cruciate ligament injury and the link to pubertal maturation: A systematic review

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**Introduction.** Anterior cruciate ligament (ACL) injury incidence rate increases following pubertal onset. Research has shown that females have a greater incidence and younger average age of non-contact ACL injury compared to males, peaking between ages 15 to 19. Sex-specific changes have been suggested in lower-extremity mechanics and postural control between maturational groups during landing or cutting tasks. This study aimed to systematically review the literature addressing sex-specific maturation phase as a potentially associated factor for changes in biomechanics associated with ACL injury. **Methods**. Five databases (CINHAL®, Cochrane Library, PubMed®, Scopus®, and SPORTDiscus) were searched. Studies including one or more biomechanical variables linked with ACL injury and exploring participants across two or more maturation phases were considered eligible. Risk of bias and study quality were assessed using a modified version of the Newcastle Ottawa Scale (NOS) and Grading of Recommendations Assessment, Development and Evaluation (GRADE). **Results**. Seventeen included studies examined 312 males (15.6%), 1374 females (68.7%), and 315 individuals of undefined sex (15.7%). Maturation phases included pre-pubertal, early-pubertal, mid-pubertal, late-pubertal, post-pubertal, and young adult. The NOS rankings of methodological quality was considered good for most studies ($n$ = 15, 88%), and satisfactory for two (12%). Studies most commonly examined knee abduction angle, knee abduction moment, knee flexion, and ground reaction forces and were classified as having a low or medium overall quality of evidence according to the GRADE. Knee abduction angles and moments, and knee flexion angles were generally greater in late and post-pubertal females compared to pre-pubertal females and males across all maturation groups during both landing and cutting tasks. Normalised ground reaction forces were generally greater in less mature participants. **Conclusions**. Late and post-pubertal females demonstrate biomechanics associated with increased ACL injury risk during landing and cutting tasks. Specifically, in response to maturational development, females demonstrated increased knee abduction angles and moments, and decreased knee flexion angles and ranges of motion. Considering sex and maturation is required for selecting appropriate tasks in injury risk identification processes and exercises for ACL injury prevention strategy development.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

**Are the LEOMO motion sensors valid to assess maximum seated sprint cycling kinematics, and do kinematic measures relate to performance?**

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**Introduction.** Inertial measurement units (IMUs) are becoming increasingly popular within the sporting environment. However, even though encouraged, IMU metrics are seldom validated in sport-specific conditions. LEOMO™ is a commercial IMU system that provides a range of cycling-specific motion performance indicators (MPIs), offering a mobile solution for monitoring cyclists. A recent validation paper compares LEOMO against 2D data collected over steady-state cycling bouts on an ergometer (Plaza-Bravo et al., 2022). The LEOMO system provides a valid lower-limb range of motion measures, but its validity in more dynamic cycling conditions is undetermined. We aimed to validate the LEOMO sensors during maximum sprint cycling against a three-dimensional (3D) motion capture system. A secondary aim was to explore the relationship between peak power and the MPIs. **Methods.** Seventeen elite track cyclists (11M, 6F) performed 3x15s seated maximum start efforts on an ergometer. Power data were sampled from the Wahoo ergometer, 3D marker data were recorded at 200 Hz using an 8-camera 3D motion capture system and the LEOMO sensor data were collected at 100 Hz. A generic musculoskeletal model was scaled for each cyclist, and inverse kinematics derived using OpenSim 4.4. Segmental orientations for the pelvis, feet, and thighs were used to calculate the MPIs. **Results.** Based on the intraclass correlation coefficient ($ICC_{3,1}$), the MPIs derived from 3D and LEOMO showed moderate agreement (0.50<ICC<0.75) for the right foot angular range (FAR); left foot angular range first quadrant (FARQ1); right leg angular range (LAR); and mean angle of the pelvis in the sagittal plane. There was poor agreement (ICC<0.50) between the MPIs from the two systems for the left FAR, right FARQ1, left LAR, and mean range of motion of the pelvis in the frontal and transverse planes. Only one LEOMO-derived pelvic rotation (r=0.535) and two 3D-derived right FARQ1 (r=0.558) and right FAR (r= 0.692) MPIs largely and significantly positively correlated with peak power. **Conclusions.** Caution is advised regarding using LEOMO for short maximal seated cycling efforts. There may be value in greater right foot FAR and FARQ1 for peak power generation in short sprint efforts from a seated position.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

# Exercise Physiology III

## The effects of habitual resistance exercise training on cerebrovascular responses to lower body dynamic resistance exercise

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**Introduction.** Resistance exercise (RE) is a popular mode of exercise for general and athletic populations due to the resultant increases in muscular strength and size. However, dynamic RE produces large sinusoidal fluctuations in blood pressure with concomitant fluctuations in middle cerebral artery blood velocity (MCAv). Repeated exposure to such blood pressure extremes may produce functional vascular adaptations in the brain. The purpose of this study was to examine the effects of habitual RE training on the within RE cerebrovascular responses. **Methods.** Resistance-trained (n=15, F=4) and healthy untrained individuals (n=15, F=12), completed 4 sets of 10 paced repetitions (2s eccentric and 2s concentric) of unilateral leg extension exercise at 60% of predicted 1 repetition maximum (1RM). Beat-to-beat MCAv, blood pressure, and end-tidal carbon dioxide were measured throughout. Peak, trough, and peak-to-trough differences for the mean arterial blood pressure (MAP) and mean MCAv ($MCAv_{mean}$) perturbations for each repetition were averaged across each set. Mixed measures two-way ANOVAs were used to analyze dependent variables during exercise (training x sets, 2x4). Unpaired t-tests were used to compare group characteristics. **Results.** The groups were matched for age (26±7 vs. 25±86 years for resistance-trained and untrained respectively, P=0.683) and weight (78±15 vs. 71±15 kg, P=0.683), however, the resistance-trained group had a greater 60% 1RM leg extension (44±12 vs. 30±8 kg, P<.001). Peak MAP values (~10 mm Hg, training effect P=0.039), and the amplitude of the blood pressure fluctuations (P=0.002), were greater for the resistance-trained group. An interaction effect was apparent for peak $MCAv_{mean}$ values to be greater in the untrained group (e.g., set 1 66±10 vs. 72±10 cm/s, P=0.050), although no post-hoc differences were observed (P=0.135). $MCAv_{mean}$ peak-to-trough difference was similar between groups (interaction effect P=0.797). **Conclusions.** These data indicate that despite resistance-trained individuals demonstrating greater fluctuations in MAP within RE, $MCAv_{mean}$ was unchanged versus their untrained counterparts. Therefore, it is plausible that regular RE may result in functional vascular adaptations that stabilise MCAv during RE.
**Conflict of Interest**. The authors declare no relevant conflict of interest in relation to this work.

## Acute physiological responses of blood flow restriction during recovery in high-intensity interval training in trained cyclists

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**Introduction.** High-intensity interval training (HIIT) is a key component in preparing for competitive cycling by enhancing aerobic and anaerobic capacities. However, the muscle's adaptive capacity can be attenuated with increased training status, indicating the need for varied and progressive training strategies. Blood flow restriction (BFR) is increasingly used as a supplementary training methodology to enhance sports performance. This study examines the physiological responses to BFR applied in recovery phases within a HIIT session in trained cyclists. **Methods.** Eleven highly-trained road cyclists (mean±SD age: 28±7 y, height: 175±7 cm, body mass: 69±6 kg, $\dot{V}O_{2peak}$ 65±9 $mL \cdot kg^{-1} \cdot min^{-1}$) completed two conditions in a randomised crossover design: HIIT with BFR (BFR) and without (CON). HIIT consisted of 6x 30-second cycling work bouts at 85% maximal 30-second power output interspersed with 4.5-minutes of recovery. In the BFR condition, 2-minutes of quadricep occlusion was applied during the early recovery phase and removed thereafter (late recovery phase). Respiratory responses ($\dot{V}O_2$, $\dot{V}CO_2$, and $\dot{V}E$), muscle oxygen saturation (TSI), heart rate (HR), and serum vascular endothelial growth factor (VEGF) were assessed. **Results.** During work bouts, BFR led to a *small* but significant increase in $\dot{V}CO_2$ and $\dot{V}E$ (both $p<0.05$, $d<0.5$), compared to CON, with no differences in $\dot{V}O_2$, TSI, or HR (all $p>0.05$). In the early recovery phase, BFR resulted in *large* and significant decreases in TSI, $\dot{V}O_2$, $\dot{V}CO_2$, and $\dot{V}E$ (all $p<0.01$, $d>0.8$) compared to CON, with no change in HR ($p>0.05$). During the late recovery phase, BFR was

associated with *large* and significant increases in $\dot{V}O_2$, $\dot{V}CO_2$, and $\dot{V}E$ (all $p<0.05$, $d>0.8$), *small* but significant increases in HR ($p<0.05$, $d<0.5$), and a *large* and significant decrease in TSI ($p<0.01$, $d>0.8$). A significant condition x time interaction for VEGF revealed that VEGF increased by a greater magnitude following the BFR condition with a *large* effect size ($d>0.8$), compared to the CON condition. **Conclusions.** The results suggest that applying quadricep BFR during recovery from high-intensity cycling augmented metabolic and oxidative stress and angiogenic signalling in trained cyclists compared to exercise alone. The greater physiological perturbations suggest incorporating BFR into HIIT may enhance the training stimulus and adaptations over time.
**Conflict of Interest**. The authors declare no relevant conflict of interest in relation to this work.

### The physical function of retired elite athletes compared to the general population: A preliminary analysis

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**Introduction.** Elite athletes push the limits of human performance and capability. There is limited literature on whether physiological stresses experienced by athletes in their prime years are beneficial to ageing. Assessing physical function in athletes over the age of 60 years may enhance our understanding of ageing in elite athletes and promote healthy ageing in the general population. The current preliminary analysis compared the physical function of retired elite New Zealand athletes with the general population. **Methods**. This cross-sectional study assessed retired elite New Zealand athletes over the age of 60 years who competed at Olympic or Commonwealth Games level. Preliminary analysis used data from physical assessments including grip strength as a proxy for muscle strength, Short Physical Performance Battery (SPPB) as a measure of lower extremity function (static balance, gait ability, muscle strength), Timed-Up and Go (TUG) as a proxy for agility and the two-minute step test as a measure of aerobic capacity. Results were compared to sex- and age-specific normative data using independent samples t-tests. Normative data from population studies that best matched the sample were used if New Zealand normative data was unavailable. **Results.** The current sample comprised twenty-five athletes with a mean age of 76 (SD 7.6) years. In total, 70% (n = 17) of the sample were male and 84% (n = 21) were endurance athletes. Retired elite athletes were found to be significantly stronger (grip strength $\Delta$6.15 kg, $p=0.022$) and more agile (TUG $\Delta$2.46 sec, $p<0.001$), compared to the general population. There were no significant differences in SPPB ($\Delta$-0.17, $p=0.546$) or the two-minute step test ($\Delta$-4.11, $p=0.467$) between the two groups. **Conclusions.** The findings from this study indicate that retire elite New Zealand athletes exhibit better physical function as they age compared to the general population. Additionally, the results indicate that these former athletes display lower levels of frailty compared to the general population. These findings provide evidence of healthy ageing within this specific cohort, warranting promotion of physical activity throughout the lifespan.
**Conflict of Interest.** The authors declare no relevant conflict in relation to this work.

## Biomechanics II

### Relevance of calf muscle metrics for athletic sprint performance

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**Introduction.** The seated isometric heel-rise test (HRT) is used to assess calf function in athletes, but it does not fully consider the muscle's stretch-shortening cycle required for sports. Further, this position limits gastrocnemius force production and functional relevance of the test to running and sprinting where gastrocnemius and soleus are involved. Therefore, we investigated the association between various calf test metrics and sprint performance outcomes to determine which calf metric is the most relevant in this context. **Methods.** Thirty active participants (14M, 16F) completed a test

battery of single-leg strength, power, and endurance calf tests, as well as 0-40m maximum sprints. Sprint outcomes included maximal sprint acceleration (MSA, 0-10m time) and speed (MSS, 30-40m time). Calf muscle metrics included seated and standing isometric strength (N), peak eccentric-concentric reactive power under 20% body mass load (W), and total repetitions and work from endurance testing. Pearson correlation coefficients were computed to assess the relationship between calf metrics and sprint outcomes. **Results.** Peak force in the standing isometric HRT was largely correlated to MSS ($r = -0.544$, $p = 0.002$) and MSA ($r = -0.562$, $p = 0.001$); whereas in seated, correlations were moderate (MSS: $r = -0.470$, $p = 0.009$; MSA: $r = -0.459$, $p = 0.011$). Peak power showed large correlations with MSA ($r = -0.678$, $p < 0.001$) and MSS ($r = -0.707$, $p < 0.001$), as did total work during endurance testing (MSA: $r = -0.588$, MSS: $r = -0.578$, both $p < 0.001$). **Conclusions.** Our findings emphasise that isometric calf testing in standing is more strongly linked to sprinting ability than seated. When completing endurance HRT, total work should be considered rather than repetitions as the former is more representative of function, congruent with research in Achilles tendinopathy patients. The power test was the most strongly associated calf metric to sprint outcomes. This test is easy to implement and could be used in team-sport athletes as a maximal sprint acceleration and speed performance indicator.
**Conflict of Interest.** KHL is the developer of the free-to-use Calf Raise App used to collect data in this study.

**A case study exploring the differences in braking demand when descending during road cycling versus mountain biking**

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**Introduction.** Training interventions in cycling have traditionally focused on fitness, but more recent research has highlighted the importance of braking during mountain biking. To date however, there has been no literature investigating braking during road cycling. The aim of this case study is to evaluate braking on a road cycling decent compared to a mountain bike trail descent. **Methods.** Using a mountain bike equipped with BrakeAce PF2 wireless brake sensors, one cyclist completed two descents on both a road (DHR) and mountain bike descent (DHM) that were matched for elevation loss. Braking and GPS data were collected and analysed using the BrakeAce mobile app. **Results** Total elevation loss was 228 and 250m, with total descending time of 303 and 242s and average velocity of 11.0 & 4.5 m/s for DHR and DHM, respectively. Total brake time was 23.6 & 25.3s, with total brake work of 19.1 & 9.2kJ, for DHR & DHM, respectively. Across 12 brake events for each condition, average brake power was 805W and 362W, respectively. The average change in velocity per brake event was -1.35 m/s (DHR) & -0.53 m/s (DHM) with normalized brake work (NBW; unitless) of 7 & 32.5, respectively. Brake balance was 62/38% and 30/70% for the front and rear brakes, in DHR & DHM, respectively. **Conclusions.** There was a greater reliance on the front brake when descending on the road. The higher average velocity in DHR was accompanied by greater brake work and higher average brake power when compared with DHM. Greater NBW during DHM indicated a higher overall braking demand, which could be attributed to the technical nature of the riding and hard braking required at relatively low speeds. However, the average change in velocity is greater when braking in DHR, which indicates a great potential for lost time. More research is needed to investigate braking during road cycling and the efficacy of interventions to improve speed conservation.
**Conflict of Interest.** Miller, M., Martin, R., Raymond, D. are affiliated with BrakeAce, which supported this research. However, this affiliation does not affect the study's impartiality and integrity.

**Representative testing design – the importance of where testing occurs: A rowing case study.**

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**Introduction.** A key part of sport is learning to train for the performance environment you are to compete in. Therefore, a high level of representativeness is required to better allow athletes to adapt to not only the physical performance environment, but also the tactical, technical and perceptual demands. The level of representative design of training session can greatly enhance the athlete's ability to successful compete in performance setting. This oral presentation will use rowing as a case study to discuss representative training design and the need for careful consideration of testing environments. Low back pain (LBP) is the most prevalent injury in rowing. Greater frequency of fixed rowing ergometers use has been associated with increased LBP, and sliding ergometers are proposed to reduce the stress on the spine. The purpose of this study was to examine the lumbar flexion curvature in conjunction with the foot and handle forces, on fixed and sliding ergometers versus on water conditions. **Methods.** Four elite female adult rowers volunteered for this study and completed a 1,000-meter maximal test on the stationary and fixed ergometers and then on water. Forces at the handle, and foot block were measured over the three trials. Lumbar curvature (% flexion) was calculated for the first half of the

drive phase of stroke from the catch position. **Results.** Results indicate that fixed rowing ergometers induced the greatest amount of lumbar flexion, with some reduction for sliding ergometers compared to on water. Handle forces on the fixed ergometer were greater than on water but no different for the sliding ergometer. There was a trend for the foot forces to be greater on the fixed ergometer. Rowers moved differently in the three conditions and this is most evident when comparing between the fixed ergometer to on-water rowing. **Conclusions.** These results indicate that those clinicians and coaches managing low back pain in rowers should advise that when returning to rowing following an episode of back pain, on water is the least stressful activity on the spine, followed by sliding ergs and finally the fixed ergometer.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

**Maximise or normalise? Examining drop-land-cut distances in youth athletes**

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**Introduction.** Court and field sports require frequent single-leg landings and changes of direction, movements associated with non-contact anterior cruciate ligament (ACL) injury. ACL injury risk screening should be sport-specific, reflective of potentially injurious situations, and implementable in clinical settings. This study compared drop-land-cut distances under maximal and normalised conditions in youth athletes, accounting for test order and limb-dominance. **Methods**. Twenty-six court or field sport adolescent athletes (13.52 ± 4.11 years, 16 females), performed a 30 cm drop landing onto one foot before immediately leaping 90° laterally to land on their contralateral foot. Three drop-land-cuts were performed leaping to a normalised (150% of leg length) distance and three to a maximal-effort distance on both the dominant and non-dominant limbs, the order of which was randomised. Distance data were recorded using 2D video. Repeated measures ANOVA with pairwise t-test comparisons and effect sizes [95% confidence interval] were used to compare leaping distances between conditions, sides, and order of tests. **Results**. Participants leapt significantly further during the maximal effort (172.1 ± 21.2 cm) than normalised (156.2 ± 10.5 cm) condition ($p < 0.001$, 9.02%, 15.8 ± 15.9 cm). The difference was *large* (Hedge's *g* effect size 1.16 [0.73, 1.62]). No significant differences in leaping distance were found between limbs or based on order of testing. **Conclusions**. Athletes leapt significantly further during the drop-land-cut task when requiring a maximal effort than when normalising the distance to 150% of leg length. However, landing distance was more variable under the maximal condition, as indicates the larger standard deviations. Normalising leaping distance to leg length allows standardisation of the drop-land-cut task and facilitates comparisons between individuals, but it may not elicit a maximal response or sufficiently represent an injury-risk specific situation. Studies should select a protocol specific to the study goals. Future research should investigate whether lower-extremity kinematics and kinetics differ between tasks and the specificity of these manoeuvres to the biomechanics related to ACL injury risk.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

**The comparison of on-snow to off-snow landings for elite park & pipe freestyle-ski and snowboard athletes**

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**Introduction.** To assist freestyle-ski and snowboard athletes in their progression of aerial rotations, a combination of on-snow and off-snow facilities (e.g. trampolines, air-landing bags) are employed [1], [2]. When learning a new manoeuvre, athletes will progress from a landing bag to on-snow once the injury likelihood of a fall is reduced [2]. Therefore, a large number of falls occur during off-snow training. While research has found head and face injuries account for 10-13% of injuries at the elite level [3], no research has been conducted regarding head kinematics on landing bags. The application of instrumented mouthguards (iMG) provides an opportunity to accurately and non-invasively monitor head kinematics during ski and snowboard training. This research aimed to gain insight into on and off-snow head acceleration events (HAE) experienced by elite park & pipe athletes. **Methods.** Ten elite and development athletes (14-20y) participated in this study. Head kinematics were recorded with custom-fit iMG (Prevent Biometrics), and HAEs were video verified. Mixed model analyses were fitted to assess the differences in HAEs (PAA, PLA) by landing context (on-snow × off-snow) while controlling for intra-athlete correlations. Log transformations were applied for inference testing due to the right skew distribution of the HAE data. **Results.** Of the preliminary results, 248 HAEs were captured over nine days. The off-snow landings had a median peak linear acceleration (PLA) of 6.4g (range 5 – 50 g) and a peak angular acceleration (PAA) of 128rad/sec$^2$ (range 57.9-536) On-snow landings had a median PLA of 6.1g (range 5-13.2 g) and PAA of 110rad/sec$^2$ (range 12-933.4). Overall, the off-snow landings resulted in significantly higher magnitude HAEs for

both PLA (4.48g [3.20-6.25], t(13.62), p<0.001) and PAA (38.9rad/sec$^2$ [9.3-162.6], ], t(6.9), p<0.001). **Conclusions.** In conclusion, head accelerations on the landing bag were significantly higher. Current strength and conditioning approaches are for performance enhancement and injury prevention [4]. This study supports the introduction of neck strengthening to these programmes and neck-specific warm-up exercises to attenuate head acceleration forces and risk of injury, especially when preparing for landing bag training sessions.
**Conflict of Interest.** This study received research funding from Snow Sports New Zealand, and Brit Smith received a master's scholarship from the University of Otago.

**Are super shoes a super placebo? A pilot study in female recreational runners.**

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**Introduction.** Since 2017, athletes running in advanced footwear technology (AFT) have broken all world records from 5 km to the marathon. The combination of a curved carbon-fibre plate in the midsole and a lightweight, energy-returning foam has been shown to enhance running economy (RE) by an average of 4% in elite and recreational runners. However, whether a placebo effect is present remains unknown. We aimed to examine the potential placebo effect of AFT on RE and perceptual measures in recreational female runners. **Methods.** In this pilot study, 11 female recreational runners (31.6 years ± 8.2, 45.1 mL/kg/min $VO_{2max}$) ran 4 x 6-minute trials at 10 km/h and 1% incline on a treadmill in two shoe conditions. Participants ran in both shoes twice in a mirrored sequence. The two shoes were the same (Nike Vaporfly 2), but one was described as a "super shoe" with AFT and the other as a knock-off replica without AFT. Physiological data were collected using a Parvo Metabolic cart, Polar heart rate monitor, and Lactate-Pro 2 Analyser. After each trial, perceptual data were collected using 100-point visual analogue scales using QualtricsXM and the running footwear comfort assessment tool (RUN-CAT). **Results.** Running in "super shoes" was perceived as more comfortable, more likely to enhance performance, easier, and more pleasurable than the knock-off (p £ 0.024, $d$ = 0.76 to 1.13). There were no significant differences in RUN-CAT or perceived risk of injury between shoes. Oxygen consumption was 1.8% (± 1.6%) greater in "super shoes" than in knock-off (p = 0.05, $d$ = 0.30). Lactate, heart rate, ratings of perceived exertion, and respiratory exchange ratio were not significantly different between shoes (p ³ 0.057). **Conclusions.** Perceptual measures of comfort favoured the "super shoes", supporting that descriptors can influence runners' perceptions and agreeing with our hypothesis. However, the higher oxygen consumption in "super shoes" indicates a detriment in running economy, contradicting our hypothesis, and highlighting that footwear comfort is not necessarily linked to economy.
**Conflict of Interest.** Two authors involved in this project are speakers for The Running Clinic. No footwear company was involved.

## Exercise Physiology IV

**Sleep regularity influences sleep duration in professional rugby union athletes**

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**Introduction.** Maintaining a consistent sleep and wake time is often reported as a key component of circadian rhythmicity and quality sleep. However, the impact of sleep onset and offset time variability on overall sleep metrics are underreported in elite athlete populations. This study investigated the relationship between sleep onset and offset time variability using the sleep regularity index (SRI) and measures of sleep and well-being in professional rugby union athletes. **Methods.** Twenty-three professional rugby union athletes (mean ± SD, age: 23 ± 3 y; body mass, 104.9 ± 10.7 kg; stature, 187.0 ± 6.9 cm) underwent sleep monitoring via wrist actigraphy for three weeks during pre-season training and completed a daily

wellness questionnaire that included fatigue, muscle soreness, stress, and perceived sleep quality. Median SRI was calculated and used to stratify the athletes into two quantile groups for analysis: Regular (>76.4 SRI, n = 11) and Irregular (<76.4 SRI, n = 12). **Results.** The regular sleep group showed significantly longer total sleep duration ($p$ = 0.02, $d$ = 0.97 ±0.85) compared to the irregular group (7:42±0:29 vs 7:18 ± 0:20 h:min per night, respectively). Pearson's correlation analysis revealed a moderate correlation between SRI and total sleep duration ($r$ = 0.43). Furthermore, while not statistically significant, the regular sleep group showed greater sleep efficiency ($d$= 0.69 ± 0.85; $p$ = 0.09) and less waking episodes per night ($d$= 0.71 ± 0.83; $p$ = 0.09) compared to irregular sleepers characterised by moderate effect sizes. No differences were seen for any of the daily wellness measures or self-reported sleep quality (all $p$> 0.37). **Conclusions.** The results from this study indicate that minimizing variability in sleep onset and offset time is beneficial for increasing sleep duration and may improve sleep efficiency during pre-season training in elite rugby union athletes. This study provides clear evidence for the importance of including sleep-wake routines as a key component of sleep education interventions.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Development of affordable, ruggedised and portable ECG and respiratory measurements from Movesense devices**

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**Introduction.** The primary objective of this line of research is to develop a novel approach to human performance assessment by utilising Movesense wearable devices, with applications in elite sport performance analysis, injury monitoring, and clinical settings. Movesense sensors are open-source, low-cost, programmable devices with Bluetooth capability. This study focuses on the validity and reliability of a Movesense ECG measurement obtained through a self-created R-peak detection algorithm and an ECG data collection system based on a customised Movesense firmware and a self-created Android app. These measurements will be compared against a standard 3-lead ECG system. Additionally, the study will compare derived heart rate variability metrics from Movesense ECG with those obtained from leading commercial systems. **Methods.** Twenty-three participants undertook either a running (9 males, 7 females; age: 22 ± 3 y) or cycling protocol (5 males, 2 females; age: 23 ± 3 y). Both protocols had five consecutive phases: (i) seated rest for 5 min; (ii) a 6-min warm-up, 8 km/h (running) or 100 W (cycling) for 2 min; (iii) step incremental exercise, by 1 km/h or 30–40 W-M every 2 min until exhaustion; (iv) 6 min cool-down at the warm-up workload, and; (v) 5-min seated rest. Continuous ECG was obtained using a 3-lead ECG at 1000 Hz, Movesense via chest belt at 500 Hz, and Garmin HRM chest device. Inspiration and expiration were measured using a respiratory flow turbine at 1000 Hz. Data synchronisation was achieved through a self-created algorithm. **Results.** The ECG peak detection algorithm successfully mitigates the challenges associated with missing peaks and artefacts, resulting in the acquisition of accurate RR interval and peak voltage data. Agreement between Movesense and 3-lead ECG was excellent. The mean diff was less than 0.37 ± 4.49 ms for all phases, with a correlation coefficient (r) greater than 0.979 (0.999 for resting and cycling). **Conclusions.** The agreement between Movesense and 3-lead is excellent. Movesense devices are attractive for exercise monitoring because of difficulties collecting ECG data with 3-lead systems. Using portable, accurate devices will enable high-quality HRV and derived metrics in the field.
**Conflict of Interest.** The authors declare no relevant conflicts of interest in relation to this work.

**Not your everyday flossing: We're talking muscle tissue**

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**Introduction.** Floss bands (FLOSS) have gained recent popularity in performance settings due to the proposed mechanism of partial vascular occlusion and fascial shearing. These mechanisms are believed to increase range of motion and performance. While previous studies have evaluated the impact of FLOSS on the ankle and knee joint, this is the first study to evaluate the hip and in addition, utilise females only. **Methods.** In a counterbalanced control condition design, twenty female participants conducted 2-mins of FLOSS which involved ten anterior and posterior pelvic tilts and bodyweight lunging on each side. FLOSS was removed and with the contralateral limb acting as the control (CON), supine hip flexion range of motion, maximal isometric hip abduction and adduction were measured. **Results.** A one-way ANOVA and post-hoc analysis, with Bonferroni correction was applied to compare differences. Isometric abduction maximum force production was not statistically significantly different and *trivial* between conditions; mean, SD comparisons, respectively (CON vs FLOSS = 240.34 ± 59.44; 232.69 ± 55.89 Newtons, $p$ > 0.05, $d$ = < 0.20). Isometric

adduction maximum force production was not statistically significantly different between conditions and a *trivial* effect size was observed (CON vs FLOSS = 236.85 ± 60.10, 239.44 ± 67.86 Newtons, $d = < 0.20$). An independent samples t-test revealed that there was no statistically significant difference between CON & FLOSS ($p = 0.89$; $d = 0.05$, *trivial*). Means and standard deviation comparisons between CON & FLOSS, respectively (110 ± 11.45; 110 ± 10.18 degrees). **Conclusions.** It appears that FLOSS did not significantly enhance range of motion or hip isometric abduction and adduction force in the current study. Perhaps a consideration and limitation of the protocol employed is that the hip joint is vast and it is not practical to cover the entire ball and socket joint. In previous studies that have revealed a benefit from the use of FLOSS, the entire joint capsule was covered by FLOSS and the structure was a hinge joint. Future studies should consider whether there is a practical way of utilising FLOSS to cover the entire hip ball and socket joint. The authors declare no conflicts of interest.
**Conflict of Interest**. The authors declare no relevant conflict of interest in relation to this work.

**Review of associations between sport specialisation and movement competency in youth**

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**Introduction.** Negative long-term outcomes have been reported following sport specialisation, including increased injury risk. The underlying mechanisms remain unclear; however, fewer exposures to broad ranging movement patterns and reductions in movement competency have been proposed as potential mechanisms. This study aimed to synthesise the evidence and examine if an association is present between sport specialisation and movement competency. **Methods.** A systematic electronic database search was conducted using combinations of appropriate key words. Only original peer-reviewed articles published in English were included. Studies were required to report sport participation and some classification of sport specialisation when participants were aged 18 years or younger, and an assessment of movement competency was also required. Results from included studies were compared based on definitions of sport specialisation, movement competency measures, and findings. **Results.** Thirteen articles were included. Four studies reported no significant differences in movement competency based on specialisation status, while seven showed some measures of movement competency differed, but not others. The remaining two studies concluded that adult athletes who participated in two or more sports during high school exhibited better movement competency than those who specialised in a single sport. Multi-sport athletes commonly displayed improved jump mechanics and performance compared to those competing in a single sport (6/9 studies). **Conclusions.** Consistent differences in movement competency based on level of sport specialisation were not shown; however, sport specialisation may result in poorer jump mechanics/performance than playing multiple sports. Methods used to classify specialisation, and to assess movement competency vary greatly, making it difficult to compare. There is a need for more consistency and focused research to enable us to determine whether sport specialisation influences movement competency, and to guide recommendations for youth sport participation.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

**Coaches' perceptions on the impact of a short-sprint coach education intervention**

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**Introduction.** Fundamental to the development of high-quality coaching is coach learning. Coach education (CE) is a major part of coach learning and development, specifically at the elite level. While the literature available demonstrated a significant association between coach education and coaching efficacy, surprisingly, there is a scarcity of evidence on the impact of coach education programmes (CEPs), specifically in track and field. Therefore, the purpose of this study was to investigate coaches' perceptions on the impact of a formal CE setting designed to promote short-sprint coaches on their coaching practice. **Methods.** With ethics approval, data were collected from eight short-sprint coaches through non-participant observations, evaluation survey within two weeks of their participation and semi-structured interviews again six months later in order to investigate how coaches developed professional knowledge (skills and practices) as a result of the CEP. Quantitative and qualitative data were analysed using descriptive and thematic analysis respectively. **Results.** Quantitative results centred around four principal themes; (1) perceived benefits; (2) perceived future-benefits; (3) enjoyment; and, (4) future plans while qualitative findings resulted four principal themes; (1) personal and professional knowledge; (2) coaching efficacy; (3) coaching practice; and, most significantly, (4) the use of the periodised training as a way of effectively maximise athlete's performance. The findings of the study revealed that coaches obtained knowledge

by engaging in a comprehensive learning environment that was directly relevant to their coaching context. As a consequence of the knowledge gained through the CEP, coaches reported an increased sense of readiness in enhancing the performance of elite athletes. **Conclusions.** Combined, these results highlight the importance of providing formal CE that is learner-centred, offers a wide range of learning experiences, and incorporates informal learning concepts into formal learning contexts. For these coaches, deep learning appeared to occur, allowing them to modify, for example, how they approached periodised training. Implications: The implications of these findings are a demand for elite CEP to assist practitioners in accepting and living with the complex and anxiety-inducing uncertainty in their roles by providing realistic strategies for dealing with it. Additionally, these findings shed light on how coaches may improve their practices and on how national governing bodies (NGBs) can implement more effective CE practices.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

# ABSTRACTS - POSTER PRESENTATIONS

## Poster Session I

### School travel and perceptions of walking to school in New Zealand adolescents prior to versus during the COVID-19 pandemic

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**Introduction.** Rates of active transport to school among adolescents in developed countries declined in the years prior to COVID-19 pandemic restrictions. However, evidence regarding the impact of these restrictions on adolescents' school travel patterns is currently lacking from many countries. This study compared school travel modes and perceptions of walking to school among New Zealand adolescents 5-6 years prior to (Study 1 (S1)) and during (Study 2 (S2)) the COVID-19 pandemic. **Methods.** Adolescents (13-18 years) from all 12 secondary schools in Dunedin, New Zealand, participated in the Built Environment and Active Transport to School (BEATS) Research Programme at S1 (2014/2015; n=1,463; 55% female) and S2 (2021/2022 when school were open; n=1,421; 44% female). Adolescents completed an online questionnaire about their school transport and perceptions of walking to school. Home-to-school distance was calculated using Geographic Information Systems. A threshold of <2.25 km defined adolescents living within walkable distance. Data analysis included Chi-square tests, logistic regression and ordinary least squares regression. **Results.** The odds of adolescents walking to school 'all the time'/'most of the time' versus 'never'/'sometimes'/'rarely' were significantly lower at S2 compared with S1. The odds of walking to school at S2 were only 0.63 of those at S1 (95% CI 0.53-0.74) for the entire sample and 0.64 (95% CI 0.48-0.84) for adolescents living within walking distance to school. In the total sample, the number of family cars increased from 69% with >2 cars at S1 to 78% at S2. Attitudes towards walking to school also indicated significantly lower intentions and higher perceived barriers to walking to school at S2 versus S1, although differences were lower among those living within walking distance to school. **Conclusions.** During the pandemic period, participating adolescents reported lower frequencies of walking to school and more barriers to walking to school compared with pre-pandemic levels. These findings reinforce the need for continued cross-sectoral efforts to enable and encourage active school transport among adolescents and policy responses in the advent of similar circumstances.
**Conflict of Interest.** Sandra Mandic works at AGILE Research Ltd. (www.agileresearch.nz) and Wellington City Council (New Zealand). Other authors have no conflict of interest.

**Correlates of achieving sufficient physical activity through public transport commuting, in a large Australian city**

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**Introduction.** Active commuting via only walking/cycling is infeasible for most Australian commuters due to distance. Public transport (PT) use may offer opportunities for walking or cycling, contributing to meeting physical activity (PA) guidelines. Although extensive research has identified correlates of commuting via walking/cycling, there is limited evidence identifying correlates of achieving sufficient physical activity (PA) from PT commuting. This paper aims to identify correlates of achieving ≥30 minutes of PA/day from PT commuting. **Methods.** From 2012-18, the Victorian Integrated Survey of Travel and Activity (VISTA) collected data using a self-report single-day travel diary from individuals in randomly selected households in Melbourne and Geelong. Duration of the active components of commuting trips (between home and work) reported by working adults (n=8,130), were analysed. The analyses included only those using public transport (defined as including ≥1 trip leg by train, tram or bus). Mixed-effects logit regressions were used to identify significant correlates (household and individual variables) of PT commuters achieving ≥30 minutes PA during commuting trips. **Results.** Overall, 1660 (20%) commuters used PT, and their median active component was 27 min/day (IQR: 18 - 39 min/day). Of these PT commuters, 736 (45%) achieved ≥30 minutes of commuting PA/day. Odds of achieving ≥30 minutes of PA while commuting were significantly lower among women (OR=0.62, 95% CI: 0.45 - 0.85), individuals with an independent driving licence (0.44, 0.26-0.74), those living in households in outer Melbourne suburbs (0.31, 0.16 - 0.60), and those in households with ≥2 cars (0.68, 0.48 - 0.96). No significant associations were identified with distance, age, income, work hours, number of children or household number of bicycles. **Conclusions.** Understanding factors associated with achieving sufficient PA from PT commuting may help in identifying strategies to increase population PA. This study found no significant relationships with several factors previously shown to be significantly related to walking or cycling to work, most notably distance and age. These findings suggests that active commuting, in the sense of achieving 30 mins of PA, is feasible for a larger percentage of the Australian population than previously identified, if coupled with PT use.

**Influence of parental factors on WHO global guidelines for Japanese children under the age of five: The SUNRISE International Study**

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**Introduction.** Childhood is a crucial phase for children to not only acquire motor skills but also build physical fitness and a healthy lifestyle. The World Health Organization recommends that for a health day, children between three and four years of age should 1) spend at least 180 minutes in a variety of physical activities, 2) avoid more than one hour of sedentary screen time, and 3) have 10-13 hours of good quality sleep. The home environment is a central factor that affects children to adhere to these guidelines. Children are especially influenced by parents since they spend considerable time with them. However, the impact of latent parental factors, such as educational career and age, on children's lifestyles is unclear. **Methods.** A total of 121 children (46.2% boys; mean age=4.2 years) participated in this study. They were recruited from the Kanto area (Ibaraki, Kanagawa, and Tokyo) in Japan. Children from Ibaraki were defined as rural children (n=66) whereas those from Kanagawa and Tokyo were defined as urban children (n=55) according to the population density in each city. Total physical activity was measured using a triaxial accelerometer (ActiGraph GT3X) for a minimum of three days. Children's sedentary screen time and sleep time as well as parents' educational level and age were assessed through a questionnaire. Multiple regression analysis was used to control for children's age, gender, and sector (urban/rural). **Results.** The majority of questionnaires were completed by mothers (96.7%) who also identified as the main caregivers (98.3%). Children's physical activity, sedentary screen time, and sleep time were not related to parents' educational levels. In contrast, parents' age showed a significant negative correlation with physical activity. **Conclusions.** Children who had older mothers tended to be less physically active. To improve this situation, childcare facilities, such

as kindergarten and nursery schools, should provide adequate opportunities for children to become physically active.
**Conflict of Interest.** This work was supported by JSPS KAKENHI (Grant Number 22H03497), the 37th (FY2021) Murata Science Foundation Research Grant, and Research Grant from the Institute of Nutritional Sciences at the Kagawa Nutrition University.

**The physical activity environment in Aotearoa New Zealand early childhood education**

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**Introduction.** Early Childhood Education (ECE) is an ideal setting to influence physical activity (PA) participation. Factors that have been associated with PA levels within an ECE setting include the influence of caregivers, environment, outdoor play, motor skill development, and competence. ECE teacher self-efficacy is often predictive of their capability and probability of promoting healthy activity behaviours in childcare settings. The aim of this research was to determine ECE teachers' self-efficacy in the delivery of PA in an ECE setting, and the quality of the ECE movement environment in Ministry of Education (MOE) licensed, teacher led ECE in Hawke's Bay (HB), Aotearoa, New Zealand (NZ). **Methods.** Participants were 42 qualified and fully or provisionally registered ECE teachers, and 6 ECE settings. ECE teachers' task and barrier self-efficacy were assessed using the Early Childhood Educators' Confidence in Outdoor Movement, Physical Activity, Sedentary and Screen Behaviours Questionnaire (ECE-COMPASS). The ECE movement environment, including structure (e.g., resources) and process (e.g., activities) quality were measured using the Movement Environment Rating Scale (MOVERS). Descriptive statistics (M± SD) were determined to examine ECE teachers' total task, and barrier knowledge scores on a rating scale of 0 (not confident at all), 5 (moderately confident) to 10 (completely confident). MOE licensed ECE movement environment characteristic scores were derived from the 11 item MOVERS; rated on a 7-point scale; 1 (inadequate), 3 (minimal), 5 (good) and 7 (excellent), with midpoint scores of 2,4 and 6. **Results.** ECE teacher overall total mean score of ECE-COMPASS task self-efficacy was 7.2± 2.3, and barrier self-efficacy 7.0± 2.5. ECE movement environment quality overall total mean score of the MOVERS subscales was 4.0± 0.6. **Conclusions.** ECE teachers in Aotearoa, NZ self-report being between moderately confident and completely confident in delivery of PA behaviours in an ECE setting during the childcare day. Results indicate the MOE licensed ECE movement settings are of between minimal and good quality. These findings are very similar to those reported to-date in Norway, Canada and Australian ECE settings.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Pre-pregnancy, prenatal and perinatal predictors of physical activity in Australian children: Data from the Mothers and their Children's Health study**

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**Introduction.** Exploring the Developmental Origins of Health and Disease Theory in physical activity, the aim of this study was to investigate the pre-pregnancy, prenatal and perinatal determinants of self-reported physical activity in Australian children aged 2-12. **Methods.** Data were from 5,005 children and their mothers from the Mothers and their Children's Health, a nested study within the 1973-78 cohort of the Australian Longitudinal Study on Women's Health. Child physical activity levels were self-reported by the mother and children were classified as active if they met the Australian Physical Activity Guidelines. Poisson regression models were used to examine the associations of pre-pregnancy (maternal education, ability to manage on available income, maternal body mass index, maternal physical activity levels and maternal smoking status), prenatal (gestational diabetes and hypertension during pregnancy) and perinatal (maternal age at birth, preterm birth, birth order, birthweight and sex) exposure variables with children's physical activity in two age groups (2-4 and 5-12 years). **Results.** Fifty-two percent of children aged 2-4, and only 18.2% of children aged 5-12 were active. Children whose mothers had high levels of physical activity were 26% (2-4 years) and 29% (5-12 years) more likely to be active than those children whose mothers had moderate levels of physical activity. Birth order (second born) was a correlate of physical activity in both age groups. At age 2-4, lower maternal education (compared to a university degree) and high birthweight (compared to normal birthweight) were associated with a higher prevalence of active children. At age 5-12, boys and those whose mothers were an ex-smoker (compared to a non-smoker) had the highest prevalence of active children. No other associations were observed for the remaining exposure variables. **Conclusions.** The association of sex with physical activity levels in children aged 5-12 as well as the large difference in percentage of children active between each age group, indicates the need for physical activity interventions that target girls and children aged five and over. The findings contribute longitudinal data to the literature regarding the determinants

of physical activity in Australian children.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### Co-designing a physical activity service for people from refugee and asylum seeking backgrounds

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**Introduction.** People from refugee and asylum seeker backgrounds resettling in Australia often experience intersecting risks for poor mental and physical health. Physical activity can promote better health outcomes, however there are limited programs tailored for this population. Therefore, understanding how to support refugees and asylum seekers to engage in physical activity is crucial. This research aims to describe how the experience-based co-design (EBCD) process was used to identify priorities for an exercise service for refugees and asylum seekers. **Methods.** Using the EBCD framework we conducted qualitative interviews and a series of focus groups with service users (refugees and asylum seekers living in the community) and service providers at a community centre in Sydney, Australia. **Results.** Sixteen participants, including eight service users and eight service providers engaged in the EBCD process over 12-months. The interviews revealed common themes or 'touchpoints' including barriers and enablers to physical activity participation such as access, safety and competing stressors. Subsequent co-design focus groups resulted in the establishment of six fundamental priorities and actionable strategies; ensuring cultural and psychological safety, promoting accessibility, facilitating support to access basic needs, enhancing physical activity literacy and fostering social connection. **Conclusions.** Using EBCD methodology, this study used the insights and lived experiences of both service users and providers to co-design a physical activity service for refugees and asylum seekers. The identified priorities should be adopted when promoting physical activity among this population to ensure programs are accessible, safe and inclusive. The results of the implementation and evaluation of the program are ongoing.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### 'A different ball game': Engaging men from rural areas in a sport-themed behavioural physical activity and weight management programme

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**Introduction.** Men resident in rural areas are underrepresented in weight management. Aussie-Fans in Training (Aussie-FIT) is an evidence-based behavioural physical activity and weight management program that has been piloted with Australian Football League clubs. Aussie-FIT was highly attractive to urban-residing men in Western Australia (WA) and demonstrated promising program effects. The extent to which Aussie-FIT could help engage men in rural contexts without access to professional sporting clubs is unclear. The aims of this study were to: engage local stakeholders to inform the adaptation of Aussie-FIT for rural towns ('phase 1'); examine and explore the recruitment and engagement of rural-residing men in the adapted Aussie-FIT program ('phase 2'). **Methods.** In phase 1, seven focus groups were undertaken with stakeholders (n=24) in three rural WA towns. Focus group data were analysed using the framework approach, and findings informed Aussie-FIT adaptation. In phase 2, rural men aged 35-65 years living with overweight or obesity were recruited to participate in Aussie-FIT. Mixed-methods data included questionnaires, attendance registers, and five post-program participant focus groups (n=26). A complementary mixed-methods analysis approach was undertaken. **Results.** Themes generated in phase 1 included Australian Football as a 'common language', the 'smaller fishpond'(population) influence, and the importance of local partner organisations. Findings informed adaptations to program recruitment, delivery settings, program theme, and partnership organisations. Stakeholders recommended adopting an Australian Football theme without club affiliations and employing a multi-component recruitment strategy utilising trusted sources. In phase 2, 83/124 men (67%) expressing interest enrolled in Aussie-FIT and recruits attended 8.2 (of 12) sessions on average. Fifty-seven (69%) completed the program, although retention varied by site (59-79%), partly due to Covid-19. Program engagement was facilitated by an inclusive and supportive environment, the football program theme/setting, and within-group connections. **Conclusions.** An adaptation of Aussie-FIT, delivered in amateur local sporting contexts, engaged men in three rural towns. This study provides a case example for adapting community interventions for rural contexts and offers insight into how popular amateur sports can be utilised to engage rural men in health behaviour change programs.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Development of a physical literacy intervention delivered in medical centres**

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**Purpose.** The concept of Physical Literacy (PL) suggests that an individual with a holistic vision of physical activity will have more chances to remain physically active over life (Longmuir & Tremblay, 2016). It has been proved that Physical activity (PA) promotion strategies are successful in medical centres (Sallis & Al., 2015). Our project aimed to set up PL interventions by a physical educator in medical centres to improve the PA level of adult chronic disease patients. A PL assessment tool specifically targeting this population was developed in advance. **Project Description.** In 2018, the Belgian health care system put in place several integrated care initiatives, in the form of pilot-projects, centred on chronic disease patients. Medical centres around Liege were recruited and volunteer patients took part in 1 to 3 PL assessments and counselling meetings with a specialized physical educator, for a total of 192 PL meetings. Each meeting followed a motivational interviewing technique and consisted of (1) an anamnesis (2) a 40-item questionnaire PL assessment divided into the psychological, social and cognitive domain of PL; (3) 4 physical tests to assess the physical domain of PL; (4) a patient-centred discussion including feedback of the results and the setting of SMART individual goals. Recruitment was made by health care professionals of the medical centres. To assess the feasibility of this project, 20 semi-structured interviews were conducted with patients (10), professionals (8) and external stakeholders (2). Sub-themes were highlighted and grouped into meaning units before qualitative analysis. **Conclusions.** This pilot-project was a first attempt to develop and evaluate the interest of a PL intervention in a medical centre setting. Analysis of the meaning units not only highlight the enthusiasm and conviction of the participants regarding the PL intervention, but also the importance of communication between PL stakeholders, medical centre professionals and researchers in charge of data analysis of the PL assessment. Nevertheless, it represents a first step for PL to be integrated into health care initiatives in Belgium.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Exploring three pedagogical approaches to developing fundamental movement skills in children**

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**Introduction.** Fundamental movement skills (FMS) are a highly researched topic, and an important area of development in primary-aged children. However, there is little evidence affirming the most effective pedagogical approach to developing fundamental movement skills. The primary aim of this pilot study was to investigate whether teaching FMS using Bothmer Gymnastics, a linear approach, or a non-linear approach is more effective for the acquisition and development of FMS in children in the school setting. **Methods.** One school in the Hunter Region, Australia, participated in this 3-armed comparison study; with seventy-five children aged 5-8 years from three classes randomly assigned to three treatment groups at the class level. Using distinct pedagogical styles across treatment groups each lesson was delivered by the same researcher during regular 60-minute physical education lessons scheduled once a week over 8-weeks, and contained identical goals, outcomes, and FMS focus (stability/body control, locomotive, and non-locomotive). Assessment of FMS (Test of Gross Motor Development) were conducted at baseline (May 2022) and 8-weeks follow-up. Data was analysed using SPSS Statical Data editor 3- way linear model. **Results.** A significant treatment effect was observed for locomotor, manipulative, and total Fundamental Movement Skills. Students in the non-linear (NL) and linear approach groups (L) showed significant improvements compared to the Bothmer Gymnastics group (BG) for 1) Locomotor skills (including run, hop, skip, jump, sliding and gallop) BG-L: t(45): 2.78, <0.08; BG-NL: t(47)=4.32, <0.001; NL-L: t(49): 1.9, <0.063; 2) Manipulative skills (catching, throwing, kicking) BG-L: t(47): -3.2, <003; BG-NL: t(49): 3.09, <0.003; NL-L: t(47): 0.074, <0.941; and 3) Total Fundamental Movement Skill development (locomotor and manipulative) BG-L: t(43) :-3.4, <0.002; BG-NL t(46): 4.02, <0.001; NL-L t(46): 0.97, 0.338 however results may change within an extended trial period or more intensity within the week. **Conclusions.** The pedagogical approaches, linear and non-linear, were effective in improving overall FMS amongst 5-8-year-old, with results from the pedagogy Bothmer Gymnastics showing a decline in FMS development over this trial period. Considering Bothmer Gymnastics is taught in many Waldorf/Steiner Schools perhaps future research should explore interventions with greater dose or duration.
**Conflict of Interest.** None

**Impact of Healthy Active Learning on physical activity of children aged 5-13 years: Measured by accelerometry**

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**Introduction.** Healthy Active Learning (HAL) aims to increase physical activity (PA) of students in school and community settings. This study examined the effect of HAL on PA metrics. **Methods.** Students (5-13y) wore an accelerometer on the non-dominant wrist for 5-7 days. Data (hourly steps; sedentary, light, moderate and vigorous minutes/hour) were recorded at two timepoints (T1=2020/21, T2=2022/23) at 46 New Zealand schools. Schools were classified by the level of intervention at each timepoint. Phase1 schools (P1) were baseline at T1, Phase2 schools (P2) were baseline at T2. Logistic regression explored the effect of HAL over time for overall movement; in-school (9am-3pm); out-of-school (7-9am/3-9pm, weekdays); weekdays; and weekend movement. **Results.** Overall, 1972 students (~53% female, mean age 9.5y) participated from 17 Phase1 schools (n=756[T1], n 457[T2]) and 19 Phase 2 schools (n=489[T1], n=272[T2]). Some students (n=134) took part at both timepoints. In-school steps increased over time for Phase 2 schools and decreased for Phase 1 schools (1213[T1, P1] to 1178[T2, P1] steps/hour, 1177 [T1, P2] to 1215 [T2, P2] steps/hour, p=0.001). Overall, in-school, and weekday light minutes/hour increased for Phase 1 and Phase 2 schools (20[T1, P1] to 33[T2, P1] minutes/hour, 20 [T1, P2] to 33 [T2, P2] minutes/hour, p=0.02; p<0.001, p=0.03 respectively). In-school and weekday moderate/vigorous minutes/hour decreased for Phase 1 and Phase 2 school (21 [T1, P1] to 14 [T2, P1] minutes/hour, 22 [T1, P2] to 15 [T2, P2] minutes/hour, p<0.001; p=0.02 respectively). No effect of HAL over time was observed for overall, out-of-school, weekdays and weekend steps; any time measure of sedentary minutes/hour; out-of-school and weekend light minutes/hour; overall, out-of-school and weekend moderate/vigorous minutes/hour; nor longitudinal student data. **Conclusions.** The data slightly favours Phase2 schools, maybe due to the PA workforce/advisors implementing a more efficient and applicable intervention based on experience between T1 and T2.

**Impact of the Healthy Active Learning initiative on educational outcomes**

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**Introduction.** Educational outcomes, including reducing inequities, are enhanced when students and whanau are engaged with school communities. One mechanism to support such engagement is through the promotion of health and physical education (HPE). This presentation reports some key education-focused findings from the Healthy Active Learning (HAL) initiative. HAL is a large-scale initiative operating in schools in NZ (N=900) with a purpose to improve physical activity and wellbeing of students. While the initiative has a focus on enhancing HPE, physical activity, and food environments within New Zealand schools, it is also important to explore and understand the impact this work may have on educational outcomes, including student and whānau engagement, or changes to teachers' thinking and practice regarding HPE activities. **Methods.** These outcomes were explored using quantitative and qualitative surveys with students, teachers, and whānau. Additional qualitative data was also gathered using interviews with students and teachers. Analysis of quantitative data was done using a log linear regression and Chi-squared approach to highlight the relationships between multiple variables. Qualitative data was analysed using a thematic approach. **Results.** Key findings signal that with increased HAL intervention, teachers' confidence for teaching HPE increased, particularly those in non-urban areas. Teachers and school leaders also believed that physical activity was a key part of student well-being, and became more cognizant of healthy food and drink options within their school settings, and HPE activities, identifying more work was needed in that area. Students were consulted more on physical activity opportunities and had more access to inclusive physical activity opportunities, and whanau felt that the suitability of physical activities increased. In particular, students from Pasifika whānau became more interested in sporting opportunities. It was also shown that students applied the skills and attitudes gained from physical activities to other learning areas. **Conclusions.** These findings are significant within the educational landscape in New Zealand, particularly with many inequities identified in previous research, such as engagement of Pasifika students. This work shows that the HAL initiative supports educational outcomes, including student engagement and attitudes towards learning.
**Conflict of Interest.** Neil Snowling is an employee of Sport New Zealand.

**Impact of Healthy Active Learning on the motivations of physical activity of children aged 5-13 years**

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**Introduction.** Whilst physical activity (PA) is widely considered as important and having potential to contribute to a range of positive physical and mental health outcomes, participation rates in New Zealand are lower than desired and appear to decline with age. This highlights the importance of ensuring that we provide effective PA opportunities for our young children/tamariki. The Healthy Active Learning (HAL) initiative involves a holistic and collaborative approach to enhance the delivery of PA opportunities within our schools/kura. The aim of this study was to examine whether there were changes to students perceptions of and motivations for PA during the initiative. **Methods.** Students (5-13y) completed a PA motivation survey (BREQ) during school time. Younger students (5-7y) were guided individually or in small groups, while older students (8-13y) completed the survey on their own. Data was collected at two timepoints (T1=2020/21, n=3501; T2=2022/23, n=3478) at 46 NZ schools. **Results.** Most students (88%) agreed that PA is good for them, and many (81%) agreed that 'PA makes me happy' with a small increase at T2. ~80% of students reported wanting to take part in PA and these were consistent across timepoints demonstrating that many are motivated to engage in some form of PA. Whilst many gender, age, and cultural groups recorded an increase in motivation over time, Pacifica and female groups largely recorded small decreases. ~73% of students reported enjoying their PA engagement at school. The perception of being encouraged to engage in PA declined across age, gender, and ethnicity groups. **Conclusions.** HAL is having an impact on perceptions of and motivation for PA, likely due to the improved practices and opportunities available to students. Particular population groups may benefit from more targeted interventions; this may include introducing novel activities and opportunities, and establishing environments that will more effectively nurture their particular motivation to engage in and enjoy PA.

### Moanamana: Connecting watersports with school communities to provide quality physical activity experiences for students as they restore marine ecosystems

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**Purpose.** Sport New Zealand (SNZ) is leading an educational project called 'In Our Backyard' which is creating new opportunities for students to learn with sport as Aotearoa New Zealand (NZ) hosts a series of major sporting events. 'In Our Backyard' supports schools, sports, and communities to improve the wellbeing of students by engaging them in new, different, and innovative physical activity experiences. Moanamana is part of the 'In Our Backyard' project and uses the international SailGP event, which is being held in NZ each year from 2023 to 2026, as a catalyst to reinvent how watersports clubs engage with schools. **Project Description.** The Moanamana project has developed quality physical activity experiences for students that also give them the skills and knowledge to act on the effects of pollution, climate change and overfishing in their local marine environment. A prototype NZ Blue Belt site, which is a marine area protected to increase biodiversity and restore low stocks of marine life, has been created in Wellington with the help of an Unlocking Curious Minds grant and an Enriching Local Curriculum grant from across the NZ Government. Worser Bay Boating Club and the schools in the Motu Kairangi Kāhui Ako have created tools and processes that get students and the local community physically active as they monitor ocean health and restore marine ecosystems in the Wellington harbour. Over the next two years, Yachting NZ is scaling up this approach to create four more NZ Blue Belt sites around the country through a partnership with SNZ, with the aspirational goal of expanding to five water sports and 32 NZ Blue Belt sites between 2024 and 2028. **Conclusions.** The project is contributing to a shift in policy and practice in the role of sports clubs in responding to the environmental challenges facing society in NZ. These changes are achieved by harnessing the reach and appeal of international sporting events and engaging local communities in physical activity in the natural environment.

**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

### A qualitative investigation of Australian university students' perceptions of health behaviours and relationships with educational outcomes

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**Introduction.** The World Health Organisation's (WHO) framework on health behaviours and educational outcomes (EO) outlines that this relationship has a variety of influencing factors at different levels of influence. However, few studies have explored university students' perceptions of multiple health behaviours and their relationships with EO. Therefore, the aims of this study were to explore university students' perceptions about (a) factors influencing their health behaviours

and, (b) relationships between health behaviours and EO. **Methods.** Participants were 37 domestic and international undergraduate students (32 females; mean age: 20.3±3.43 years) studying in various academic years and programs at the main campus of a large metropolitan university in Brisbane, Australia. Data were collected through focus groups, which were facilitated using a semi-structured question guide. Data were initially analysed using an inductive reflexive thematic approach to develop themes, followed by deductive thematic analysis to map the identified themes onto the WHO framework. **Results.** Several themes were identified regarding factors that influence students' health behaviours. These included factors at the micro (knowledge and skills; personal attributes; socio-demographic characteristics; time), meso (geographic location; university; social influences), and macro (COVID-19 related policies and restrictions) levels. Two themes were identified that related to students' perceptions of the association between health behaviours and EO. The first one focused on associations with short-term EO (overall grades, other indicators of academic performance), whereas the second one related to elements students perceived to mediate the relationship between health behaviours and EO (attendance and concentration; motivation to, and quality of, study). Health conditions and well-being were reported to have a reciprocal relationship with health behaviours and were also perceived to influence EO. Sleep was the main behaviour discussed in conversations related to EO. **Conclusions.** Findings highlight the importance of developing strategies that address multiple levels of influence and target multiple health behaviours within an educational context to optimise university students' health and EO. Intervention efforts focusing on the development of time management skills and understanding about sedentary behaviour may be particularly useful for this population.
**Conflict of Interest.** The authors have no conflicts of interest to declare.

**Movement behaviours, study load and health outcomes in university students**

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**Introduction.** The university learning environment is often characterized by prolonged sitting and low levels physical activity. University students also often experience poor mental and physical health especially during periods of high study load. The aim of this longitudinal observational study was to investigate university student movement behaviours and health outcomes across a university semester (i.e. early- and late- semester). **Methods.** Movement behaviours of moderate to vigorous physical activity (MVPA) and sitting time were measured using GeneActiv and ActivPAL devices worn for 8 consecutive days. Participants completed an 8-day study log and at the end of the monitoring period completed both the depression and anxiety stress scale (DASS-21) and a localised musculoskeletal discomfort (LMD) scale. All measures were completed twice during one university semester, i.e. during early semester (within weeks 1-3) and late semester (within weeks 11-13). **Results.** Data were available at both time points for n = 24 undergraduate university students (71% female, age = 19 - 36 years). There were no significant differences in the measured behaviours between early and late semester: Study time = 179.8 vs 170.8 min.d-1; MVPA = 58.3 vs 62.5 min.d-1; sitting time = 434.2 vs 434.1 min,d-1. Participants generally had low levels of pain across all body part regions. Mean DASS scores for the sample remained consistent for both depression and anxiety (normal severity) across the semester, while stress slightly increased (from a moderate to severe rating) at late semester (ns). Depression scores were significantly correlated with study time ($rs = 0.43$, $p<0.05$) at early semester, but not at late semester ($rs = 0.191$, $p=0.39$). No other significant associations were detected. **Conclusions.** Movement behaviours, mental health and musculoskeletal pain outcomes were similar at early- and late-semester in this sample. Few data on university student populations exist in the literature. Despite the small sample size this study presents useful objectively measured movement and health outcomes data that could be included in a future meta-analysis or integrative data analysis.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Development of a blended intervention to promote physical activity, health and work productivity for office employees using intervention mapping framework**

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**Introduction.** Regular participation to moderate-to-vigorous physical activity (MVPA) can reduce the risk of noncommunicable diseases and mortality, and thus improve overall health. Office employees are particularly at elevated risk for insufficient MVPA due to their sedentary and desk-based work patterns. This study aimed to develop an effective intervention to promote MVPA, health, and work productivity using the Intervention Mapping (IM) framework. **Methods.** The first four steps of the IM framework were adopted to develop the intervention. In Step 1, a needs assessment was mainly completed through a literature review and two focus groups; in Step 2, intervention outcomes and objectives were specified to develop a matrix of change objectives; in Step 3, theory- and evidence-based behaviour change methods and appropriate delivery modes were formulated to design an intervention; and in Step 4, all intervention materials developed

in preceding steps were refined and finalized with a pilot test. **Results.** Based on the first four steps of the IM, a 12-week three-grouped blended intervention was then developed, consisting of a blended intervention group (combining web-based with face-to-face approaches), a web-based intervention group, and an active control group. **Conclusions.** The IM is a useful tool that provides a systematic and structured process for developing interventions that address complex issues. The use of IM is expected to increase the effectiveness of the intervention in improving PA levels, health, and work productivity among employees.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Do regular activity breaks performed in the laboratory impact subsequent free living activity patterns? A randomized crossover study**

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**Introduction.** Interrupting laboratory based sedentary behaviour with regular activity breaks is known to positively impact postprandial metabolism, however, much less is known about how these enforced patterns of activity impact subsequent free-living activities. The aim of this study was to investigate the impact of laboratory performed regular activity breaks on sleep, sedentary time and physical activity during the subsequent 48 h free-living period. **Methods.** Twenty-eight healthy men (n=8) and women participated in a randomized cross over study. The prolonged sitting intervention involved sitting for 4 hours starting at ~5pm. The regular activity breaks intervention involved performing 3 min of body weight resistance exercise every 30 min for 4 hours (also beginning at ~ 5 pm). Upon completion of the 4-hour laboratory-based interventions participants returned to their free-living environment but wore and ActiGraph accelerometer on their non-dominant wrist for 48 hours. **Results.** When compared to prolonged sitting, regular activity breaks intervention resulted in a 29.3 min (95% CI 1.3 to 57.2 min) extension in the sleep period immediately following the intervention, however there were no differences in total 48 h sleep duration (difference 0.0 min; 95% CI -20.5 to 20.5 min), total activity (difference -7.9 min; 95% CI -57.8 to 42.1) or sedentary time (difference 15.0 min; 95% CI-52.0 to 81.9). **Conclusions.** Performing an enforced period of regular activity breaks in the lab does result in any large compensatory effects on subsequent free living sedentary time or total activity. The acute sleep extension effect of performing regular activity breaks should be further investigated.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Domain-specific sedentary behaviours' typologies and total sedentary time among office-based workers: A latent profile analysis**

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**Introduction.** Sedentary behaviours (SBs) in many settings were interrelated due to shared correlations. The present study aimed to identify domain-specific SB typologies in office-based workers and to examine their association with total sedentary time. **Methods.** In February 2019, web-based cross-sectional survey was conducted to 3,200 workers aged 20-59 years. The following information were obtained: 1) daily time in SB in six domains (car, public transportation, work, television, computer/tablet, and other leisure time), 2) socio-demographic characteristic (age, sex, marital status, children, household income, and education), and 3) lifestyle characteristic (body mass index, smoking, alcohol, chronic diseases, moderate-to-vigorous physical activity, sleep duration, working hours, job position, and job type). Total sedentary time was calculated by summing time spent in six domain-specific SBs. Domain-specific SB typologies were determined using a latent profile analysis. Analysis of covariance with Bonferroni's multiple comparison test was applied to compare total sedentary time by the determined typologies, adjusted for all the socio-demographic and lifestyle variables. **Results.** Finally, 2,005 office-based workers (female: 53%; age: 40.8±10.7years) were analysed. Three typologies were identified: 1) less SB in public transportation and more SB in workplace, watching television, and using a computer, 2) less SB in workplace, watching television, using a computer, and other leisure time, and 3) less SB in a car and more SB in public transportation, workplace, watching television, using a computer, and other leisure time. Total sedentary time was different across three typologies ($F(2,1984) = 383.8$, $p<0.001$). Total sedentary time for the first typology was 582.4 ± 7.8 minutes/day. The second typology showed the shortest total sedentary time (208.9 ± 15.3 minutes/day) whereas the third typology showed the longest total sedentary time (622.8 ± 7.8 minutes/day). **Conclusions.** SBs in the workplace, watching television, and using a computer were coincident. When they spend less sedentary time in these situations, their

total sedentary time was restricted. Reducing sedentary time in the workplace, watching television, or using a computer may be the first approach for reducing total sedentary time among office-based workers.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Association of eating behaviour, physical activity, and sedentary behaviour with sleep duration among Japanese workers**

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**Introduction.** Previous studies showed that nutrition and physical activity are related to sleep duration, however no studies focused on eating behaviour. Focusing on eating behaviours can be a strategy to promote behavioural change toward a healthier lifestyle. Thus, the present study aimed to determine the extent to which eating behaviour and physical activity are related to sleep duration in Japanese workers. **Methods.** A web-based cross-sectional survey of 3,200 Japanese workers aged 20 to 59 was conducted in February 2019. Participants provided the following information: 1) daily sleep duration, 2) eating behaviour (frequency of having snacks and skipping, amount to eat, and speed of eating), 3) daily time in moderate-to-vigorous physical activity (MVPA) and sedentary behaviour, and 4) sociodemographic and lifestyle characteristic (age, sex, body mass index, marital status, employment status, household income, education, and smoking). The answer for eating behaviours were dichotomized as follows: 1) l-2 times/week of snacks as 'non-snack' and > 2 times/week as 'snacks', 2) <2 times/week of skipping as 'non-skipping' and >2 times/week as 'skipping', 3) eating large amount of food as 'a lot' and normal or a little amount of food as 'normal', 4) fast eating speed as 'faster' and eating normal or slow eating speed as 'normal'. Multiple linear regression analysis was used to test the associations of eating behaviour, physical activity, and sedentary behaviour with sleep duration, adjusted for all the sociodemographic and lifestyle variables. **Results.** The final analysis included 3,152 Japanese workers (female: 50.2%; age: 40.1±10.7years). Participants reported a mean of 379.15 (SD=60.97) minutes of sleep daily. More snacking (B=-10.47, 95%Cl: -15.1, -5.82, p=0.001), eating a lot (B=-8.12, 95%Cl: -13.03, -3.20, p=0.001), and higher MVPA (B=-0.004, 95%Cl: 1.30, 10.18, p=0.008) were negatively associated with sleep duration, whereas eating faster (B=5.74, 95%Cl: 1.30, 10.18, p=0.01) was positively associated with sleep duration. However, skipping and sedentary behaviour were not associated with sleep duration. **Conclusions.** The present study showed that adequate sleep duration may play an important role in improving eating behaviour such as snacking, eating a lot and MVPA level in Japanese workers.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**A systematic review and meta-analysis of the associations between motor competence and executive functions in children and adolescents**

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**Introduction.** Emerging evidence has suggested that the process of motor skill acquisition may have cognitive benefits for children and adolescents. However, no previous systematic review has quantitively synthesised the evidence. Therefore, our systematic review and meta-analysis aimed to investigate the associations between motor competence and executive functions in children and adolescents. **Methods.** Our systematic review was guided by the Preferred Items for Systematic Review and Meta-analysis (PRISMA) statement and registered with PROSPERO (CRD42021285134). We searched six electronic databases (PubMed, PsycINFO, Scopus, Ovid MEDLINE, SPORTDiscus, and EMBASE) from inception to February 10, 2022. We included observational and experimental studies focused on the association between motor competence and executive functions in children and adolescents. **Results.** Our initial search identified a total of 10,655 records. A total of 36 studies were eligible for inclusion. From this, 30 studies including 172 effect sizes were meta-analysed using the structural equation modelling approach in R. We explore the moderating effects of age, study design and the type of motor competence. Our review included 27 cross-sectional, five experimental, and four longitudinal studies. We found an overall small-to-moderate association between motor competence and executive functions in children and adolescents [r = 0.19 (95% CI = 0.13 to 0.25)]. We also found that global motor competence (r = 0.28 [95%CI

= 0.19 to 0.37]), locomotor skills (r = 0.18 [95%CI = 0.09 to 0.26]), object control skills (r = 0.15 [95%CI = 0.06 to 0.23]) and balance (r = 0.15 [95%CI = 0.07 to 0.23]) were associated with overall executive functions. Additionally, significant associations were observed in cross-sectional (r = 0.19 [95%CI = 0.13 to 0.26]), longitudinal (r = 0.15 [95%CI = 0.02 to 0.27]) and experimental studies (Cohen's d = 0.45 [95%CI = 0.09 to 0.81]). Age was not a significant moderator of the association between motor competence and executive functions (r = 0.02 [95%CI = -0.02 to 0.05]). **Conclusions.** Our findings from observational and experimental studies suggest a small-to-moderate positive association between motor competence and executive functions in children and adolescents. Interventions targeting children's motor skills may have additional benefits for their executive functions.
**Conflict of Interest.** None

**Exploring contemporary screen time in Australian adolescents: A qualitative study**

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**Introduction.** Screen use, a highly prevalent behaviour, has been shown to be detrimental to adolescent health. To better understand this health-related behaviour, this study explored the nature of adolescents' contemporary screen engagement, adding to the currently limited body of qualitative literature in this field. **Methods.** Sixteen adolescents (9 girls and 7 boys) aged 13-17 years from a secondary school in Queensland, Australia participated in semi-structured one-on-one interviews. Key discussion topics included the types and nature of screen engagement; reasons for engaging with screens; and perceptions and attitudes towards screens. All interviews were transcribed verbatim, anonymised and thematically analysed using an inductive approach. **Results.** Smartphone use was ubiquitous, occurring mostly at home, after school, and typically used for social, entertainment and functional activities. Binge-watching and multi-screening emerged as common sedentary patterns of contemporary screen engagement, often performed solitary. Screen time appeared to be an important aspect of adolescents' social lives, while there were also some psychological, physical and behavioural concerns. Family and friends were thought to influence adolescents' screen time either directly (co-participation) or indirectly (modelling), while social smartphone notifications were said to prompt habitual, frequent, and prolonged screen engagement. **Conclusions.** This study provided novel insights into the nature, functions, patterns, and benefits and concerns of adolescents' contemporary screen engagement. Overall, adolescents engaged in a wide variety of screen-viewing practices, including newer digital media, mostly as a function to connect with friends and family. It might be beneficial for screen use reduction interventions and policies to consider the underlying social and psychological factors, and habitual nature of contemporary screen engagement among adolescents.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Perceptions and preferences of physical activity participation in adolescents: An exploratory study**

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**Introduction.** Participation in regular physical activity (PA) offers multiple health and educational benefits. However, many Bangladeshi adolescents do not regularly participate in PA and their reasons for non-participation are unknown. This study aims to explore the perceptions and preferences for PA among adolescents in Bangladesh. **Methods.** Four focus group discussions were conducted with a convenience sample of 32 students (8 per group) aged 13 to 17 years (50% girls) from four secondary schools in Dhaka, Bangladesh. Guide questions were used to explore perceptions, preferable activities/games/sports, barriers, and opportunities for PA. Each group session lasted for about 30 minutes and discussions were recorded that were transcribed by the research team; notes were also taken with the permission from the participants. Data were analysed with Nvivo-12 following a thematic analysis. **Results.** Participants were aware of the benefits of PA, such as promoting proper body growth, preventing diseases, and supporting a healthy life. Boys preferred participating in football and cricket at schools, while girls preferred skipping and running, particularly in the school yard and home. Most of the girls mentioned that they participated in PA involving household chores because of family restrictions or lack of a safe outside PA environment for girls. Television-viewing, spending time on electronic-devices (e.g., a mobile, computer, playing videogames), and lack of time were the main barriers to PA. Participants mentioned that school could provide more opportunities to participate in PA by organising both competitive and non-competitive PA or sports. They also expressed that their parents and friends could motivate them to engage in more PA. **Conclusions.** There are gender differences in preferences for PA and sports with boys preferring outdoor while girls favouring indoor activities. Both

genders faced barriers to PA; however, girls encountered additional challenges in doing outdoor PA. Our study findings might be useful in designing interventions to encourage a shift from hindering to promoting PA.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Adherence to the 24-hour movement guidelines among Japanese children and adolescents**

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**Introduction.** Adherence to the 24-Hour Movement Guidelines, which include recommendations for daily physical activity, sleep, and screen time, has a positive impact on children's health. It has been shown that higher rates of adherence to the guidelines improve mental health and health outcomes such as chronic health disorders, anxiety, depression, and obesity. However, previous studies indicated that the percentage of children meeting all three criteria is never high, ranging from about 1% to 17.5%. In Japan, there are many independent studies on physical activity, sleep duration, and screen time, and few studies on adherence with the guidelines among Japanese children. Therefore, the purpose of the present study is to clarify the current status of children in Japan by identifying the adherence rates of the guidelines and their characteristics. **Methods.** A cross-sectional survey of 398 elementary and middle school students in grades 1-8 was conducted in 2021 and the following information was obtained via questionnaire: 1) sociodemographic characteristics (grade, gender), 2) physical activity, sleep duration, and screen time. **Results.** A final sample of 394 children (male: 45.9%) was analysed. Overall, 2.8% of the children met all three guidelines. By gender, 2.2% of boys and 3.3% of girls. On the other hand, 32.7% of the children did not meet any of the guidelines. For boys and girls, the percentages were 32.6% and 32.9%, respectively. **Conclusions.** Overall, adherence with the guidelines was low, and this result was similar to or lower than in other countries. Characterizing factors contributing to low adherence to guidelines in the future may be an initial approach to improving children's health.
**Conflict of Interest.** The authors declare that there are no conflicts of interest associated with this study.

## Poster Session II

**Investigating coaches' strategies in creating motivational climates: A qualitative study**

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**Introduction.** The learning environment fostered by coaches is typically referred to as the motivational climate which reflects the attitudes, emotions, and values that coaches transmit to their players. To date, limited studies has assessed coach-created motivational environments from the perspectives of coaches and how coaches perceive the effect of the motivational climate on sport participants. Besides, a lack of research in theoretical explanations for motivated and demotivated behaviours exhibited by youth sport participants is identified. Guided by the theoretical framework of empowering coaching theory, this study aims to assess coach-created motivational environments from Hong Kong sport coaches' perspectives and how their coaching strategies effect players' participation motivation. **Methods.** In this study, an in-depth semi-structured interview guided by the empowering coaching theory was utilized and 30 sport coaches from five sport associations in Hong Kong were recruited to participate in this study. Due to the social distancing regulation caused by COVID-19 pandemic, all interviews were conducted online. Participants were asked to recall the role they played during trainings and competitions and strategies they have used or witnessed that they believed were either effective or ineffective in optimally motivating players' participations. A thematic analysis was conducted for coding and generating themes. **Results.** Coaching strategies including more communication and understanding, encouragement and inspiration, well-managed training, and blending in with players were identified under three respective sub-dimensions of empowering coaching (i.e., autonomy-supportive, task-involving, and social-supportive), while themes such as hard approach only, dominance, biased treatment, and lack of involvement reflected the controlling and ego-involving aspects of disempowering coaching. **Conclusions.** The present study extended the understanding of coaches' previous experience in delivery their coaching strategies. The findings revealed that coaches' practices could be both empowered or disempowered in creating the motivational climate. This study embraced the empowering coaching theory in contributing to the theoretical literature regarding the motivational climate of youth sport participation.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Addressing the key role of vision in physical activity research and the related health benefits**

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**Introduction.** Mira Active System, 5-years personal qualitative research project. An innovative connection between vision, health, and wellbeing. Faced with the need to improve my vision refraction problems, health, and wellbeing. Aiming to understand how vision's habits are affecting our health, vision, and wellbeing and how we can prevent it. **Methods.** An engineering project, interdisciplinary, dealing with the mechanism of vision, optics, connection with the body systems, and the health association. Working with optical, mathematical, and graphical models of the ocular globe and anatomic models of the body. Project relationship; Habits and light with near distance vision, mentally stressful cerebral activity, and direct sunlight, through vision efforts and time are accumulating stresses in our body and interfering with our body systems not allowing them to work correctly, affecting our health, vision, and wellbeing. Monitoring of my physical activity during a period of two years, walking outdoors every day (light intensity PA) with an 'active system vision', through vision access to the active system of the ANS, allowing the body systems to balance, and releasing body stress. Measuring my activity (20.937.955 steps) and making notes of stresses perceived. **Results.** The results of the monitoring match perfectly with my improvements in vision, health, and wellbeing. Recommending this practice to start to improve our health situation, and the monitoring of the activity to keep track of all the improvements. Helping to explain how a sedentary behaviour through vision, a 'passive system vision', is harming our body, damaging our health, vision, and wellbeing implying a health risk. On the other hand, how with physical activity with vision, an 'active system vision', we can revert this situation, obtaining health benefits and preventing illness, improving our health, vision, and wellbeing. **Conclusions.** Thereby reinforcing and giving support and foundation to the PA related health benefits for the general population and for people with existing medical conditions. Regarding the people less active, with chronic conditions and mental health this initiative will start to fill the gaps and make the difference.
**Conflict of Interest.** The author declares no relevant conflict of interest in relation to this work.

**Muscle contractile inactivity increases proportional to sedentary bout duration**

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**Introduction.** Prolonged sedentary behaviour bouts are associated with adverse cardiometabolic health outcomes, even after adjusting for total sedentary time. However, muscle inactivity physiology that occurs during different sedentary bouts is yet to be investigated. Using synchronised accelerometry with electromyography, we examined the muscle inactivity in sedentary behaviour and investigated moderation by sedentary bout duration. **Methods.** Concurrently worn electromyographical (EMG) sensing shorts and hip-worn accelerometry data were obtained from the EMG24 study for secondary analysis. Signals were synchronised to facilitate interpretation of thigh muscle inactivity within sedentary bouts. Sedentary behaviour was defined by acceleration threshold (Euclidian Normal Minus One [ENMO] <47.4g) and convolutional neural network algorithmic classification (CHAP-Adult). Contractile inactivity was defined by the average of four thigh channels <3uV. Using these separate sedentary behaviour definitions, the contractile inactivity occurring in sedentary behaviour was compared with non-sedentary behaviour. Linear mixed modelling was used to investigate the relationship of bout duration (log-transformed) with proportion of bout (percentage) inactive. Sedentary bouts were quintiled according to their bout duration to descriptively portray segments (i.e., start, middle, end) where contractile inactivity was most prevalent. **Results.** Fifty-five adults (male N [%]: 25 [45.5%]), mean age 43 years old (SD: 16.8) and mean BMI 23 (IQR: 21.0 - 25.9) engaged in 15,548 sedentary bouts (ENMO) or 5,427 sedentary bouts (CHAP) depending on sedentary behaviour definition. CHAP defined sedentary bouts (median: 77.3%, IQR: 34.7% - 94.0%) had greater prevalence of inactivity compared to ENMO defined bouts (41.7%, IQR: 9.3% - 81.2%). Adjusting for confounders, sedentary behaviour bout duration was associated with higher muscle inactivity (ENMO β: 7.22, 95%CI: 6.88 - 7.55; CHAP β: 6.97, 95%CI: 6.50 - 7.44) at a decreasing rate. Muscle inactivity was most prevalent in the highest bout duration quintiles during the middle of the bout. **Conclusions.** Longer sedentary bout durations are associated with higher muscle inactivity, potentially elucidating a key mechanism by which the prolonged sedentary behaviour bout phenotype exhibits deleterious associations with cardiometabolic health in humans. Limiting bouts to 30 minutes or less may be a potent strategy to mitigate muscle inactivity whilst sedentary.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Effects of physical activity and sedentary behaviour at admission on gait independence at discharge in nonambulatory stroke patients undergoing rehabilitation**

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**Introduction.** Gait disorder is a common clinical problem in stroke patients. In rehabilitation settings, stroke patients often have insufficient physical activity (PA) due to excessive sedentary behaviour (SB) caused by gait disorders. A longitudinal study found that PA at admission was associated with improved gait independence in nonambulatory stroke patients after 1 month. Thus, we hypothesized that the level of PA and SB at admission would be associated with gait independence at discharge. The purpose of the present study was to investigate the association between PA and SB at admission and gait independence at discharge in nonambulatory stroke patients undergoing rehabilitation. **Methods.** This multicentre prospective study included stroke patients who were not gait independently upon admission. Participants were recruited from 8 rehabilitation hospitals in Japan. The primary outcome was gait independence at discharge, measured using the Functional Ambulation Categories (FAC). We defined a FAC score of >4 as indicative of gait independence. PA and SB were measured using a triaxial accelerometer (Active Style Pro HJA750-C, OMRON). METs-based cut-off was used to determine each intensity of activities: >1.5 METs for SB, 1.6-2.9 METs for light-intensity PA (LIPA), and >3.0 METs for moderate- to vigorous-intensity PA (MVPA). Logistic regression analyses were used to determine whether SB, LIPA, and MVPA were associated with gait independence at discharge in separate models, even after adjusting for covariates. A P value of <0.05 was considered to indicate statistical significance. **Results.** Of 79 patients (median age: 68.0 years), 61 (77.2%) achieved gait independence in the present study. In logistic regression analyses, SB and LIPA were significantly associated with gait independence at discharge (SB: adjusted OR=0.98, 95% CI [0.97, 0.99], P=0.03. LIPA: adjusted OR=1.02, 95% CI [1.00, 1.04], P=0.03). However, MVPA was not associated with gait independence at discharge. **Conclusions.** The present study demonstrated that SB and LIPA at admission were associated with gait independence at discharge in nonambulatory stroke patients undergoing rehabilitation. These findings suggest the importance of early interventions aimed at reducing SB and increasing LIPA following admission.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Is physical exercise or melatonin supplement more effective to improve sleep quality in children with ASD?**

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**Introduction.** Previous study showed that physical exercise can modulate the endogenous melatonin level in children with autism spectrum disorder (ASD) and improved their sleep quality. However, it remains unclear whether physical exercise or melatonin supplement or a combination of both is more effective to improve sleep quality in the population. The purpose of this study is to answer this research question by comparing the effectiveness of three types of interventions (physical exercise vs melatonin supplement or combination of both) in improving sleep quality in children with ASD. **Methods.** Sixty-two children diagnosed with ASD were randomly assigned into one of four groups: cycling (n = 18), melatonin supplement (n = 14), combination of both (n = 12) and placebo control group (n = 18). Four sleep parameters (sleep efficiency, sleep onset latency, sleep duration and wake after sleep onset) were assessed. **Results.** Results revealed a significant improvement in sleep efficiency, sleep onset latency and sleep duration in all the intervention groups but not in the placebo control group. However, no significant group differences were found among the intervention groups ($p < .05$). **Conclusions.** Our findings suggest the equivalent effectiveness of physical exercise and melatonin supplement intake in improving sleep quality in children with ASD.

**Development and content validity of the Motivation Assessment Tool for Physical Activity (MAT-PA) among children with autism spectrum disorders**

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**Introduction.** Based on an existing motivation assessment tool for physical education(MAT-PE) among young children, this study switches the focuses in the context (from physical education in the UK to physical activity in Japan, China, Germany) and in the target groups (from young children(ages 6-7) to children with autism spectrum disorders(ASD)(ages 6-7) and outlines the development, content validity of a mixed-method tool to assess children with ASD's psychological needs and behavioural regulation within PA (Motivation Assessment Tool for Physical Education; MAT-PA). **Methods.** This study refers to COSMIN guideline and will be consisted of an iterative development (testing, redesigning) of the MAT-PA (version 1.0) through working with 10-20 children with ASD meeting the eligibility criteria*. In the next stage, MAT-PA (version 2.0, which is also the final version) would be subsequently examined for content validity in 30-50

eligible children with ASD and 10 independent researchers with expertise in self-determination theory, autism spectrum disorders and physical activity. Extra assessments** will be implemented to clearly inform children' diagnosis of ASD and the mental age equivalent range. *Eligibility Criteria: chronological ages are 6-17 and has a medical diagnosis of ASD according to DSM-V. **Extra assessments with caregivers: Social Responsiveness Scale, Second Edition (SRS-2) (School-Age Form), Vineland Adaptive Behaviour Scales Second Edition (VABS) (only on communicate domain); Extra assessments with children with ASD: Picture Vocabulary Test-Revised （PVT-R） (Japanese version of PPTV). **Results / Conclusions.** Further development (the codebook and construct validity) of the MAT-PA is required; nevertheless, this study would be a promising first step in developing a tool to comprehensively measure children with ASD's motivational perceptions in PA.

**Four-metre gait speed: Reliability and normative reference values in community-dwelling healthy adults**

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**Introduction.** The functional status of a person can easily be gauged using a gait speed test, with slower speeds associated with adverse health outcomes and reduced quality of life. Within Singapore, various authors assessed gait speeds over six metres and ten metres. However, no studies assessed gait speed using the 4-metre gait speed (4MGS). Therefore, the study aims to: (1) establish the intraclass correlation coefficients (ICC) for the test-retest, intra-rater and inter-rater reliability of the 4MGS; (2) establish the normative reference values of the habitual and maximum gait speed of healthy community-dwelling Singaporean adults using the 4MGS; and (3) investigate the correlation of gait speed with gender, age, height, weight, and body mass index. **Methods.** The cross-sectional convenience sampling study recruited 379 healthy community-dwelling Singaporeans (178 males, 201 females) aged between 21 and 80. Participants were excluded if they required walking aids; had uncontrolled medical conditions; were pregnant; had cognitive impairments; or any physical conditions affecting their gait. Each participant completed four trials (2 habitual speed; 2 maximum speed). **Results.** The 4-metre gait speed test demonstrated good test-retest reliability [ICC habitual speed: 0.87 (95% confidence interval: 0.85-0.90), ICC maximum speed: 0.84 (95% confidence interval: 0.80-0.87)], and excellent inter-rater [ICC habitual and maximum speed: 0.99 (95% confidence interval: 0.98-0.99)] and intra-rater reliability [ICC habitual speed: 0.92-0.95 (95% confidence interval: 0.84-0.97), ICC maximum speed: 0.87-0.93 (95% confidence interval: 0.73-0.97)]. Statistical significance was observed between genders for maximum speed ($p = 0.04$). Spearman's rank correlation coefficient established a significant correlation between age with habitual ($p<0.001$) and maximum ($p = 0.002$) speeds. Body mass index and height significantly affect the habitual ($p = 0.04$) and maximum ($p = 0.03$) speeds, respectively. **Conclusions.** The normative reference values obtained in this study were somewhat different compared to the other three studies that used different walkway lengths. As a result, the normative gait speed data amongst the different length gait speed tests should not be used interchangeably.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Criterion validity of the activPAL accelerometer in people living with cervical dystonia**

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**Introduction.** People living with dystonia are recommended to achieve the same volume of physical activity as adults and older adults however, accelerometers have not been validated in this population. In order to deliver accurate exercise prescription in this population of people that have movement limitations, these devices should be validated. The aim of this study was to validate step count and postural transitions detected by the activPAL (AP) accelerometer against direct observation (DO) during two functional assessments: the 30 second sit-to-stand (30 STS) and 6-minute usual-pace walk tests. **Methods.** A total of 11 participants with cervical dystonia (male/female n= 5/6; mean age = 61 ± 13) performed the 6-minute usual pace walking and 30 STS while wearing the activPAL. A trained observer counted steps and observed the number of sit to stands. **Results.** The average step count detected with AP and DO was 652 (287-798) and 655 (218-758) respectively. Average transitions detected were 11 (4 - 17) and 11 (4 -16) respectively. Both methods showed good agreement between observed and AP determined steps and transitions. Moreover, there was a statistically significant and strong correlation between the two methods i.e., transitions (r= 0.983, P=0.0001), and step counts (r= 0.941, P=0.0001). **Conclusions.** ActivPAL is a valid tool to measure step count and transitions between sitting and standing in people living with cervical dystonia.

**Relationship between the amount of questionnaire-assessed physical activity and objective measures determined by triaxial accelerometers among older adults in Japan**

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**Introduction.** The current study aimed to evaluate the relationship between questionnaire-assessed physical activity (PA) and objective measures determined by triaxial accelerometers in older adults in Japan. **Methods.** The participants were 65 years or older adults who underwent health check-up examination at the community house and agreed to wear an accelerometer for 7 days between 2015 and 2021. Simultaneously, we checked questionnaire-assessed PA. According to the original PA questionnaire, exercise time (ET) was defined as the time including such as walking, running, and swimming per day. Daily PA time (DPAT) was defined as the physical activities equal to walking per day. Sedentary time (ST) was defined as the physical activities such as sitting and lying per day. ET and DPAT were combined to reflect total PA (TPA) per day. On the other hand, daily step count and time spent in moderate-to-vigorous PA (MVPA) and sedentary behaviour (SB) were measured using tri-axial accelerometer. Metabolic equivalents (MET)-based cut-off points were used to define 0.9-1.5 METs for SB and 3 METs or more for MVPA. The associations between the original PA questionnaire and accelerometer-assessed PA were compared using Spearman's correlation coefficients. Statistical analysis was performed using SPSS Version 28. **Results.** A sample of 254 older adults were recruited (mean age: 75.3 (standard deviation, 6.0) years; male participants: 85, 33.5%). The median interquartile range (IQR) of ET, DPAT, and ST was 26 (13-51), 60 (30-120), and 240 (150-60) min, respectively. The median IQR of daily step count, time spent in MVPA, and time spent in SB was 5203 (3168-7252) steps, 38 (21-62) min, and 492 (430-66) min, respectively. The correlation between ET and MVPA was fair ($\rho$=0.31, $p < 0.01$). The correlation between TPA and MVPA was fair ($\rho$=0.39, $p<0.01$). There was no significant correlation between ST and SB ($\rho$=0.1, $p$=0.12). The correlation between TPA and daily step count was fair ($\rho$=0.37, $p<0.01$). **Conclusions.** Our findings revealed that using the original PA questionnaire could predict step count and the amount of MVPA in older adults.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Mobile health for promoting physical activity in schizophrenia: A scoping review**

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**Introduction.** Physical activity (PA) has been shown to have numerous benefits for both physical and mental health in healthy individuals and those with mental illness. However, schizophrenia, who require effective treatment, engage in significantly less PA compared to their healthy counterparts. Therefore, it is crucial to promote PA among schizophrenia to improve their mental health. Mobile health (mHealth) tools have gained recognition as promising resources for enhancing health care. However, the effects of utilizing mHealth to facilitate PA among schizophrenia have not been summarized. This scoping review aims to provide a comprehensive summary of findings on mHealth research for promoting PA among schizophrenia. **Methods.** A systematic search was conducted in electronic databases, including PubMed, CINAHL, and MEDLINE, to identify relevant papers. The inclusion criteria consisted of original articles that focused on mHealth or explored feelings towards mHealth, with a specific focus on PA, and involved participants diagnosed with schizophrenia or psychosis. Two independent researchers conducted the review process. **Results.** Of the 47 articles initially identified, eight articles met the eligibility criteria. Six articles focused on outpatients, while one article included a mix of outpatient, residential, and inpatients. Five articles examined the effectiveness of mHealth on PA, with four reporting positive effects, while one article did not find significant effects. Feelings towards mHealth were explored in three articles, with two reporting participants' favourable thoughts regarding its helpfulness in promoting engagement in PA and compliance with wearing a monitor. Two articles discussed the use of text messages as part of mHealth, while another utilized a Facebook secret group. One article investigated factors related to motivation for continuous use of mHealth, which revealed positive opinions and a greater likelihood of engaging in PA among those using mHealth. **Conclusions.** Despite the limited research in this area, mHealth shows promise in facilitating PA among schizophrenia. However, low compliance with using mHealth tools may hinder their widespread adoption. Further studies are needed to identify factors that can increase motivation to use mHealth tools for promoting PA among this population. Understanding these factors will contribute to the development of more effective interventions.
**Conflict of Interest.** None.

**Effects of a blended indoor and outdoor exercise program on depressive symptoms in Hong Kong older adults: A study protocol**

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**Introduction.** Depression is a common mental health problem among older adults. Evidence has demonstrated the benefits of physical exercise on depression. More research suggests that exercise in a natural environment provides greater psychological benefits compared to indoor exercise. Connectedness to nature (CTN) representing the individual's experiential sense of oneness with the natural world is associated with outdoor exercise. The combination of indoor and outdoor exercise program might be able to maximize intervention effects on mental health. The proposed study aims to examine the effects of a blended indoor and outdoor exercise program on depressive symptoms in Hong Kong older adults, and to assess the mediating role of CTN in the relationship between outdoor exercise and depressive symptoms. **Methods.** This study will apply a three-arm randomized controlled trial with double-blinded design. 144 community-dwelling older adults in Hong Kong (aged 60-74) with depressive symptoms will be randomly assigned into one of the three groups (1) a blended indoor and outdoor exercise group will receive a 16-week exercise program (2 sessions/week, 90 min/session) including multi-component training (aerobic, muscle strength, balance) under indoor condition (1 session/week) and outdoor condition (1 session/week); (2) an indoor-only exercise group will receive the same exercise program as blended group but only under indoor condition; (3) a control group will receive biweekly telephone interview about lifestyle status for 8 times. The primary outcomes will be depressive symptoms (salivary cortisol, a self-reported depression score). The secondary outcomes will include physical fitness, exercise enjoyment and CTN. All data will be measured at pre-intervention, post-intervention, and 3-month follow up after intervention. Generalized linear mixed models and structural equation modelling will be used to evaluate the intervention effects and to identify the mediating role of CTN. **Results / Conclusions.** It is expected that the blended exercise group would have greater improvement in older adults' depressive symptoms, physical fitness, exercise enjoyment than the indoor-only exercise group and the control group. The CTN would mediate the intervention effects on depression. The study findings may provide a promising approach to improve depressive symptoms in older adults.
**Conflict of Interest.** The authors report no conflicts of interest related to this study.

**The effectiveness of physical activity interventions on undergraduate university students' mental health and wellbeing: A systematic review and meta-analysis**

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**Introduction.** Mental health research has found that undergraduate students experience more symptoms of psychological distress than peers who are not at university and worse than adults of other age groups. However, not all experiences of psychological distress led to mental illness diagnoses. Students who adopt healthy behaviours such as engaging in adequate physical activity could effectively protect themselves from developing an episode of mental illness. To our knowledge, this systematic review and meta-analysis is the first to assess the effectiveness of physical activity interventions on undergraduate students' mental health. **Methods.** Seven databases were searched for papers that met the selection criteria: sampled undergraduate students; used physical activity interventions of at least 4 weeks duration; assessed mental health outcomes. Quality was assessed using the McMaster evidence review and synthesis team (MERST) tool. In total, 50 studies were included in this review. Studies with a comparable control group were meta-analysed, and remaining studies were narratively synthesised. **Results.** Meta-analyses of studies indicated physical activity interventions are effective in reducing symptoms of anxiety (n = 17; pooled SMD = -0.91, 95% CI [-1.30, -0.51]), depression (n = 13; SMD = -0.65, 95% CI [-0.94, -0.37]), and are effective for stress (n = 10; most conservative pooled SMD = -0.36, 95% CI [-0.55, -0.17]). There was considerable heterogeneity (Anxiety, I2 = 90.95%; Depression I2 = 57.81%; Stress I2 = 87.43%), consistent with the interventions using different modalities of physical activity, intervention durations, and outcome measures. Only five studies reported using a behavioural change theory in the development of the intervention. The overall quality and GRADE score was very low. **Conclusions.** Our review provides evidence supporting the potential of physical activity interventions for enhancing the mental health of undergraduate students. More research is required to better understand the optimal types and durations of behavioural change theory-informed interventions. These insights can inform the development of more targeted and effective interventions to promote the mental health and well-being of undergraduate university students.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Associations of changes in physical activity with the risk of depressive symptoms**

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**Introduction.** Depressive disorder is the leading mental issue worldwide. As the population ages, depressive symptoms would amplify the developing disabilities related to chronic illness. Facing health challenges, engaging in physical activity is proven to be associated with a lower risk of depressive symptoms. Nevertheless, most existing studies have only assessed physical activity at a single time without considering recommended-based categories. The present study aims to investigate the association between changes in physical activity and the risk of depressive symptoms. **Methods.** This study included 3,825 participants aged > 50 and without Activities of Daily Living (ADL) difficulty at baseline from the 2003 and 2007 Taiwan Longitudinal Study in Aging (TLSA) survey. Physical activity patterns were defined based on recommended activity assessed in questionnaires. A cut-off score of 10 Center of Epidemiological Studies-Depression (CES-D) score was used to identify the risk of depressive symptoms. Multiple logistic regression was applied to examine the associations between physical activity changes and depressive risk. A sub-analysis further evaluated whether the association differed by baseline physical activity classifications. **Results.** Of the 3,825 participants, 11% had depressive symptoms between two times points. Compared to those with stable activity levels, individuals with decreasing physical activity had a higher risk of depressive symptoms (OR=1.28, 95%CI: 1.02-1.62). Increasing activity was associated with a lower but non-significant risk (OR=0.95, 95%CI: 0.76-1.19). When compared to maintaining sufficient physical activity, participants with decreasing activity from an insufficient active level (OR=1.91, 95%CI: 1.18-3.11) and those who remained inactive (OR=1.68, 95%CI: 1.06-2.65) had significantly higher odds of depressive symptoms. An elevated risk was also observed in individuals who stayed insufficient activity levels at both times. However, this association did not reach significance. **Conclusions.** This study confirms the association between decreasing physical activity and a higher risk of depressive symptoms, particularly among individuals who reduced their activity from an insufficient level and remained inactive. These findings highlight the detrimental effects of reduced physical activity on depressive symptoms, underscoring the importance of public health interventions targeting individuals with low activity levels.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Physical activity and the social and emotional wellbeing of First Nations people**

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**Introduction.** Social and emotional wellbeing (SEWB) is a term used by First Nations people in Australia to represent a comprehensive perspective on mental health that acknowledges historical, cultural, and societal influences. Engaging in physical activity is a part of First Nations culture through tradition and connection to Country, offering holistic health and SEWB benefits and protection against mental health issues and chronic diseases. Physical activity fosters cultural identity and community cohesion, which are integral components of SEWB for First Nations people. This narrative review for the Australian Institute of Health and Welfare (AIHW) Indigenous Mental Health and Suicide Prevention Clearinghouse summarises existing evidence on physical activity and First Nations SEWB. **Methods.** The methodology adopts a strengths-based lens specifically through resilience, social-ecological and sociocultural approaches and a First Nations standpoint. A literature search of eight research databases and grey literature identified evidence and approaches relating to First Nations people physical activity and SEWB. Relevant evidence and approaches were synthesised and described, with practical recommendations provided using a conceptual model for First Nations wellbeing. **Results.** Ten current or recent physical activity programs and initiatives which aim to improve SEWB among First Nations people in Australia were included. Key principles for these programs focused on the social and cultural determinants of health. Programs embraced a proactive approach that encompassed the socio-cultural, socio-economic, educational and environmental factors. Most programs utilised Indigenous ways of knowing, being and doing. Six current national and three state level policies that are relevant to First Nations peoples' physical activity and SEWB were identified. These policies have consistent themes which acknowledge the importance of improving methods by which programs and services are delivered for First Nations adults to address social determinants influencing SEWB. **Conclusions.** Understanding the cultural, historical, and social factors that influence physical activity and SEWB among First Nations people is essential for developing effective programs and policies. First Nations community engagement, direction and ownership in all aspects of the conception, development, implementation and evaluation of policies and programs is essential to effective policy and practice.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Co-designing a street art walking map to promote physical activity and mental wellbeing**

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**Introduction.** The Toowoomba region in Queensland has a higher proportion of people living in the most disadvantaged socio-economic quintile compared to the rest of Queensland. Australian adults with high or very high psychological distress are 1.5 times higher than in least disadvantaged areas in 2017-18 (19.6% and 12.7%, respectively). Increases in physical activity can reduce feelings of anxiety and social isolation. Momentum Mental Health (MMH), a not-for-profit in Toowoomba, uses physical activity as a wellbeing tool. The main aim of the proposed research is to codevelop a walking art trail with consumers, including those with lived experience of adverse mental health and wellbeing. The purpose of the art trail is to increase habitual levels of physical activity and improve mental wellbeing. **Methods.** Participants will be recruited from local organisations such as MMH, Toowoomba Regional Council's (TRC) CHANGE project, and word of mouth. They will be invited to attend 2 workshops at the local Library. Workshop one will introduce participants to each other, and the main purpose of the research. They will be invited to discuss their perceptions of Toowoomba street art, determinants of physical activity and mental wellbeing. An audit of all the street art and their location will be conducted by the research team. Participants will provide insight into the art and the locations that they want included in potential walking routes, including potential distance, location and number of walking routes developed. The second workshop will co-develop the walking art trails with the research team, add information as part of the routes, and design the supporting brochures. The final (3rd) workshop will be a 'walkshop' whereby participants will walk the proposed art trials and determine any modifications required. **Results.** Once the walking art routes are developed, these will be advertised on the MMH and TRC websites. QR codes will be designed for each artwork, encouraging walkers to scan the codes and register their walk. **Conclusions.** These data will be used, in part, to measure uptake and engagement with the walking art trails and will be used in some of MMH's programs.

**A community-wide strategy on older residents to promote physical activity using a new gateway from disaster mitigation fitness**

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**Introduction.** This study evaluated the effect of a community-wide strategy to promote physical activity and awareness of disasters on older residents as a new gateway for fostering physical fitness to survive disasters (hereinafter referred to as disaster mitigation fitness), which is different from health promotion and long-term care prevention. **Methods.** A nonrandomized control study was conducted in 2020 to 2021, targeting older adults (aged 65-84 years) who were not in need of nursing care. The study subjects were living in Oyama, Shizuoka Prefecture. The intervention site consisted of all older residents (N = 603), and the control site consisted of 603 older residents stratified and randomly selected based on the basic resident registry. All households in the intervention site received flyers to promote disaster mitigation physical fitness and were invited to participate in an event of disaster mitigation fitness monthly. The intervention lasted for 11 months. The outcomes were physical activity and awareness of disasters. **Results.** Baseline and follow-up surveys were completed by 183 participants in the intervention site (response rate = 30.3%) and by 206 in the control site (response rate = 34.1%). We did not find a significant improvement in physical activity and awareness of disasters in the intervention site relative to the control site. On the other hand, the theme of disaster mitigation physical fitness suggested the possibility of social implementation, based on the cooperative structure through cross-organizational collaboration of government agencies and the media attention. **Conclusions.** The potential of improving disaster mitigation physical fitness leading to social implementation may be a positive step in the stages of change toward engagement in physical activity.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work. This research was supported by JSPS Grant-in-Aid for Scientific Research JP20K11517.

**Effect of environmental factors on older people's participation in physical exercise**

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**Introduction.** Health status, lack of companionship, and motivation are the main reasons that prevent older people from exercising. Yet, environmental factors should not be overlooked. Based upon the social-ecological model, this study aimed to examine the effect of environmental factors on older people's participation in physical activities in Hong Kong. **Methods.** A total of 514 older people aged 55 and above participated in an exercise facilitation project between November 2020 and January 2022 as service users and volunteers. The participants were invited to complete a structured survey before the project. Physical exercise level was measured by the International Physical Activity Questionnaire (IPAQ)-short form. The environmental factors consisted of variables related to both the social and physical environment. The level of enjoyment of physical exercise and whether exercise was habit of the participant were measured. Companionship for exercise and whether there were many people exercising in their nearby neighbourhood were measured by two single-item questions. Availability of space and facilities to exercise within 10 to 15-minute walking from your home was treated as the physical environmental factor. **Results.** Hierarchical regression analysis was conducted with the various environmental factors as the dependent variables, while the older people's physical exercise level, sedentary, and sleeping time were the dependent variables. Peer accompaniment to exercise significantly predicted older people's participation in physical activity. Participants aged 75 to 84 and aged 85 and above were less active in participation in physical activity than those aged 55 to 64. No other significant demographic variables were found in participants' sedentary and sleeping behaviours. **Conclusions.** The social environment is important to older people's participation in physical exercise. Peer companionship and support are crucial in motivating older people to participate in physical activity. Intervention could be focused more on the importance of peer companionship to facilitate older people's exercise behaviours.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Development of a questionnaire to assess the determinants of interrupting prolonged sedentary behaviour for older people with disabilities**

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**Introduction.** Older people with disabilities spent most of the daytime in prolonged sedentary behaviour (SB). To promote behaviour change aimed at interrupting prolonged SB, it is essential to objectively assess the determinants of individual, however no method has been established. Thus, this study aimed to develop a questionnaire to assess the determinants of interrupting prolonged SB in older people with disabilities, with good content validity. **Methods.** First, an 83 items related to 14 behavioural determinants of interrupting prolonged SB based on the theoretical domains framework (TDF) in English and Japanese was developed based on the questionnaire that can be tailored to suit different targets, actions, contexts, and times of interest, developed by Huijg JM, et al. The 3 authors discussed and removed 34 items that was difficult to understand for older people with disabilities. Eight experts (3 researchers, 4 health care professionals, and 1 government employee) participated the Delphi survey, and appropriateness as a factor in interrupting prolonged SB in older people with disabilities was rated on a 7-point Likert scale (1 = very inappropriate, 7 = very appropriate), with reasons given for items rated 1 to 4. The consensus was preliminarily defined as <80% of experts scoring as 6 or 7, and nobody scoring as 1-4. **Results.** After round 1, consensus was achieved only 18 items. In round 2, the 31 items on consensus could not be achieved in round 1 were re-evaluated, resulting agreement on 20 items. Of the 11 items for which no consensus was achieved in round 2, three items related on 'skills', 'optimism', and 'reinforcement' were re-evaluated in round 3, as no one rated them as 1-4. After round 3, consensus was achieved on 2 of 3 items and the Delphi survey converged. Ultimately, a total of 40 items were deemed to possess good content validity (scale-content validity index: 0.94). **Conclusions.** The TDF questionnaire to assess the behavioural determinants for interrupting prolonged SB in older people with disabilities was established, with good content validity. Further study is needed to investigate construct- and concurrent-validity of the questionnaire.
**Conflict of Interest.** None.

# Poster Session III

## Biomechanical effects of head and neck restraint systems for head/neck injury prevention in motorsports: A systematic review

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**Introduction.** Race car drivers are at high risk of neck injury as they are subjected to strong lateral G-forces and must maintain a rigid posture in the cockpit. As over a third of racing injuries involve the neck, the introduction of the head-and-neck support device has been an important step in motorsport safety. This systematic review was developed to evaluate the biomechanical effectiveness of Head and Neck restraint systems (HANS) and helmets in motorsports. **Methods.** Nine databases were electronically searched using a combination of specific keywords and subject headings to identify studies that evaluated the effectiveness of Head and Neck restraint systems in controlling the driver's head during impact events to mitigate head/neck injury risk. Two independent authors performed title, abstract, and full-text screening, as well as data extraction and risk of bias analysis using the Downs and Black quality assessment checklist, with a third author available to resolve any disagreements. **Results**: We found 610 studies initially. After removing duplicates, 583 were excluded based on titles and abstracts. From the remaining 27 studies, 10 met inclusion criteria after full-text screening. All 10 studies had moderate methodological quality, with scores ranging from 17 to 19 using the Downs and Black tool. They were all dummy models and explored various biomechanical parameters such as neck force, kinematic outcomes (neck moment, head rotation, head angle, and head velocity), and the head injury criterion (HIC) as a clinical measure regarding head injury risk, in contrast to not wearing a HANS and helmet. Six studies were included in the meta-analysis for head injury criteria (HIC15 and HIC36) factors. **Conclusions.** The HANS device provides effective control of head motions and neck loads that can injure race drivers, such as neck force, total neck moment, head rotation, head angle, head velocity, and HIC, resulting in kinetic and kinematic injury criteria values below the injury assessment reference values (IARVs). Therefore, the use of HANS devices and helmets should be strongly encouraged in motorsports to protect the safety and well-being of athletes. Further investigation into the underlying neuromechanical mechanisms that contribute to head and neck injuries is needed to improve the safety of motorsport athletes. Additionally, empirical studies with a standard procedure to assess head and neck supportive devices should be conducted to determine an optimal protection plan for head and neck injury prevention in motorsport.
**Conflict of Interest.** The authors declare no conflict of interest in relation to this work.

## Monitoring and confirming menstrual phases

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**Purpose.** With a growing interest in equitable research, the influence that the menstrual cycle has or doesn't have on all aspects of training and physiological performance is becoming less taboo. There are a number of internal and external factors that can influence the duration of the cycle and if ovulation occurs. Understanding the methods available to confirm and monitor menstrual phases is beneficial for understanding the existing research and developing robust data sets. **Project Description.** The menstrual cycle can be broken into four key phases: menses, follicular, ovulation, and luteal. Menstrual phases can be identified by recording changes in hormones, physiology, and anatomy. Methods of collecting identification range from subject self-reporting of physiological symptoms to validation by technicians using specialised equipment. Self-reporting options include real-time observations of discharge, daily monitoring of basal temperature, and use of luteinizing hormone detection strips. In the near future, wearable technologies may offer less invasive ways of monitoring basal temperature, but they currently lack validation for this use. Confirmation by a specialist can be done by creating a hormone profile using saliva or serum samples. There are a range of quantification methods available for both sample types, with the key limiter being the equipment available to the researcher. Of the two methods, saliva sample collection is less invasive, less technical, and samples can go directly into a freezer for mid-term storage. Ultrasound can also be used to observe the anatomical changes occurring in the reproductive tract. **Conclusions**. There are a wide range of methods for monitoring and confirming menstrual phase. Self-reported methods are easily accessed and low-cost making them a reasonable option for monitoring cycles. However, they are less reliable than methods which confirm the phases by hormone quantification and anatomical observation. Particularly for research aiming to establish relationships between hormones and performance.
**Conflict of Interest.** The author declares no relevant conflict of interest in relation to this work.

**Quality of reporting in maximal-intent resistance training interventions for older adults: A systematic review**

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**Introduction.** Maximal-intent resistance training (MIRT), otherwise known as power training or explosive resistance training (RT) shows promise as an effective training method for OAs to improve muscle mass and function and the ability to perform activities of daily living. However, the quality of intervention reporting in MIRT interventions for OAs has yet to be examined. Thus, this study systematically reviewed the quality of intervention reporting among MIRT randomised controlled trials (RCTs) for OAs. **Methods.** Eligible studies were RCTs involving community dwelling individuals aged 60 years and older who participated in MIRT, with at least one activity of daily living as a study outcome. CENTRAL, PubMed, Scopus, SPORTDiscus and Web of Science were searched up to 6 July 2022. Two independent reviewers extracted training prescription and intervention details using the Consensus on Exercise Reporting Template (CERT) and Toigo and Boutellier Framework (TBF). The percentage of interventions that adequately reported each intervention descriptor was calculated. **Results.** Ten studies (12 interventions) were included. On average, 6/17 CERT items were adequately reported (range: 3-10). Most frequently reported were 'whether exercises are generic or tailored' (100%) and 'how adherence is measured and reported' (90%). In contrast, no studies adequately reported 'whether the exercises were performed individually or in a group', a 'detailed description of each exercise to enable replication' or a 'detailed description of the exercise intervention'. On average, 5/13 TBF items were adequately reported (range 3-7). The most frequently reported items were 'intervention duration' (100%), the 'number of sets and sessions per day/week' (83%), 'load magnitude' (50%) and 'number of repetitions' (50%). Conversely, 'time under tension' was not adequately reported for any interventions and 'rest in-between reps', 'range of motion', 'anatomical definition of the exercise' and 'recovery time in-between sessions' which were each reported for 1 intervention (8%). **Conclusions.** Greater emphasis should be placed on adequately reporting training interventions to improve research transparency and replicability, enable greater confidence in the validity of the interventions and allow other researchers to build on the findings in their own work.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**The effects of balance board training with an ageing population**

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**Introduction.** Strength and balance programmes are a well-established training method for preventing falls in people over the age of 65 years. However, there is limited research investigating the effects of training using a balance board stability training device, particularly when combined with an in-home group exercise experience. The aim of this study was to evaluate the impact of the Rock-it Board stability training device on strength and balance in older adults. **Methods.** This study used a randomised parallel-group design trial with an experimental and control group. The experimental group comprised five females and two males (mean ± SD, 76.6 ± 3.0 years). The control group consisted of seven females (64.3 ± 4.7 years). Both groups completed six pre-intervention exercise tests consistent with the Otago Exercise Programme (OEP), also known as the Otago Falls Prevention Programme. The experimental group participated in six weeks of exercise sessions, twice a week for 50 minutes. The training consisted of a warm-up, and then seven dynamic balance exercises based on movements from the OEP adapted to be used with a Rock-it Board stability training device. The control group participants were asked to maintain their habitual exercise routines but refrain from additional organised training during the six weeks. **Results.** The experimental group showed a significant improvement in the Romberg Test of 36.7%, with a large effect size of 1.05 (p=0.023). The group also showed a significant improvement in the Timed Up and Go Test, getting 6.3% quicker with a moderate effect size of 0.68 (p=0.03). Other measures suggested that the invention improved the participants' performance; however, none of these measures achieved significance. **Conclusions.** The major finding of this study is that six weeks of dynamic balance training using a Rock-it Board stability training device improved several measures of balance and stability in older adults. However, the Timed Up and Go and the Romberg test- a measure of postural sway- demonstrated significant changes. Since falls rarely commence from a static position, this study recommends that programmes for older adults would benefit from more active and dynamic training interventions over static strength-based training programmes.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**The relationship between somatotype and muscle thickness in untrained participants**

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**Introduction.** This study sought to identify if there is a relationship between somatotype rating and muscle thickness (MT) measured via surface ultrasound. Previous studies have indicated that girth measurements such as upper arm girth are different between those in different dominant somatotype groups. However, it is not known whether there is a direct relationship between dominant somatotype and direct measures of muscle size such as muscle thickness. **Methods.** The research study adopted a quantitative approach using primary data collection. Participants were recruited using purposive sampling, with the requirement that they be untrained (no planned and structured resistance exercise programme currently or in the last 6-months but could still be physically active). Thirty untrained, from a resistance perspective, but physically active males (N=30) were recruited to the study. Participants' anthropometric profiles were measured and somatotype calculated via the Heath-Carter calculation method. Participants underwent ultrasound assessment of upper (bicep brachii and triceps brachii) and lower (biceps femoris, rectus femoris, gastrocnemius, soleus) body muscle groups using B-Wave ultrasound (u smart 3300, Terason, USA) with a linear array probe (4 MHz wave frequency). Images were taken in the transverse plane. A Pearson correlation analysis was carried out by plotting individual somatotype rating scores for each somatotype element against muscle thickness. A Bonferroni correction was applied to the p value ($p < 0.017$). **Results.** There were significant positive correlations between bicep brachii ($r=0.49$), biceps femoris ($r=0.54$), rectus femoris ($r=0.54$), and soleus ($r=0.47$) MT and mesomorphy rating ($p<0.017$). There were significant negative correlations between biceps femoris ($r=-0.61$), and rectus femoris ($r=-0.54$) MT and ectomorphy rating ($p<0.017$). A significant positive correlation was observed between endomorphy and gastrocnemius MT ($r = 0.50$, $p < 0.017$). **Conclusions.** The correlation analysis demonstrated positive relationships between MT and mesomorphy rating and negative relationships between MT and ectomorphy rating. Since MT is a direct measure of muscle mass, this supports the notion that a higher mesomorphy rating reflects a higher muscle mass.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Effects of an in-season rugby phase on sprint performance in senior college male rugby players**

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**Introduction.** Adolescence is a stage in life that discriminates between childhood and adulthood (10) and previous research has used 14-19 year olds to assess changes in sprint performance (SP) in male college ruby players. An in-season rugby phase (ISRP) consists of ~34-36 weeks (4) and maintenance of speed, agility, power and strength is desired. SP is a combination of sprint velocity (SV) and sprint momentum (SM) which represents the amount of force to stop them. SP progression can improve performance by increasing players' ability to break tackles, elude defenders and score tries more frequently [1, 2, 4, 5]. This study aimed to provide further understanding as to whether SP improvements could be made during an ISRP with senior college male ruby players. **Methods**. Seventeen senior male college rugby players (7 forwards and 10 backs). Pre and post 31-week ISRP, players performed three 10m sprints separated by150 seconds of rest: the quickest time (Fusion Sport SMARTSPEED TLs) was used for analysis. All participants (AP) were analysed within the group, as well as those selected for the U18 Hurricanes (HU-18) and those not selected (NHU-18). Pre and post testing results were analysed using paired t-tests (significance $p<0.05$) [4] and effect sizes (ES) were calculated using Cohen's 'd' scale. **Results.** For Sprint Velocity (SVm/s) AP group $p=0.12$, ES = 0.32 (small effect), HU-18 $p=0.53$, ES = 0.18 (trivial effect) and NHU-18, $p=0.02$, ES = 0.76 (medium effect), while for Sprint Momentum (SM(kg): AP group, $p=0.34$, ES = 0.1 (trivial effect), HU-18 $p=0.24$, ES = 0.26 (small effect) and NHU-18, $p=0.05$, ES = 0.27 (small effect). **Conclusions.** ISRP provides a sub-optimal environment for making any significant improvement in SP within a group of senior college male rugby players. However, there may be benefits in tracking fluctuations in SV every 4 weeks to identify overreaching/over training syndrome. Implementing more frequent SV testing would potentially give a better understanding to know when to implement tapers to dissipate potential endocrine fatigue.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**A comparison of three different work to rest periods during intermittent sprint training**

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**Introduction.** Team sports are characterised by high intensity bursts of activity, requiring significant energy contribution from the phosphagen pathways. Recovery between these efforts is an important consideration for training and testing. **Methods.** The effect of three different recovery periods (60 s, 90 s and 120 s) during a 10 x six-seconds intermittent sprint protocol was investigated. Thirteen national-level female, team-sport athletes participated. Peak Power (PPO), Mean Power (MPO), calorie expenditure, performance decrement, repetitions over 95% PPO, blood lactate, and RPE were recorded. **Results.** There was a significant effect of condition on MPO and calorie expenditure ($p$<0.050). MPO was significantly lower for 60 s compared to 90 s (710.4 vs 734.4 W, ES =0.27 to 0.42) and 120 s (710.4 vs 743.3 W, ES= 0.36 to 0.47). Calorie expenditure was significantly lower for 60 s compared to 90 s (4.41 vs 4.56 cal, ES= 0.25 to 0.46) and 120 s (4.41 vs 4.59 cal, ES= 0.40 to 0.48). There was a significant effect of time (60 s 11.7, 90 s 11.1. 120 s 10.9 mmol, $p$<0.010) but not condition ($p$= 0.617) for blood lactate accumulation, and a significant difference in session RPE between 60 and both 90 s and 120 s (60 s 15.5, 90 s 14.2. p= 0.034 120 s 13.9, $p$= 0.039). The number of athletes that were able to maintain their PPO over 95% is outlined in Figure 1.

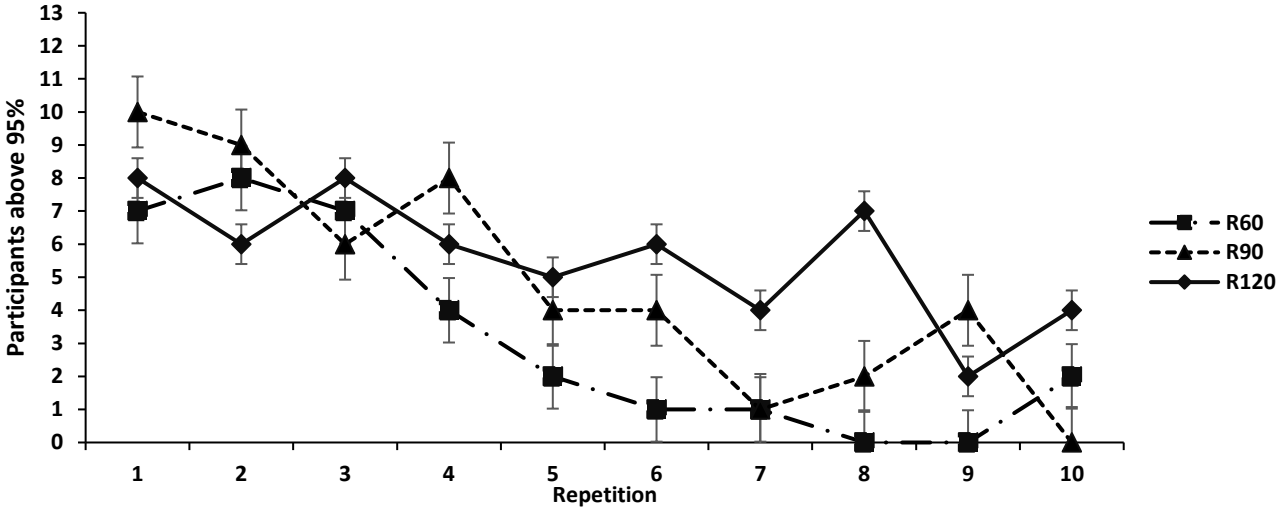


**Figure 1.** Number of participants to exceed 95% of peak power output on each repetition.

**Conclusions**. Shorter recovery durations resulted in decreased mean power and calorie expenditure, but higher RPE when compared to longer recovery periods. All three recovery periods may have fallen between the fast and slow phases of PCr resynthesis of approximately 20 and 180 s resulting in partial but not complete recovery. Total training time and repetitions where PPO above 95% should be a consideration when determining what protocol to implement for specific training outcomes.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Hormone, strength, and power adaptations to a 4-week undulating training programme emphasising long eccentric or concentric durations in rugby sevens players**

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**Introduction.** Slow-tempo strength training, which prolong time under tension, may provide additional mechanical stimuli that facilitate optimal strength development. This study examined hormonal responses to a 4-week strength training with longer eccentric or concentric durations. **Methods.** Sixteen Malaysian male rugby 7s players (21.6±2 y) trained twice a week for 4 weeks with either 5-0-2-0 (eccentric-emphasis, ECC group) or 2-0-5-0 (concentric-emphasis, CON) exercise tempo. Exercises included back squat, bench press, Romanian deadlift, military press, and leg press with the loads increasing every week (undulating scheme) from 60% (3-4 sets x 10 reps), 65% (4x8), 75% (4x5), and 80% (4x3). One-repetition maximum (1-RM) back squat (eccentric and concentric), bench press, countermovement jump (CMJ), drop jump (DJ), single and repetitive horizontal jumps, 40m sprint, 505 agility, and salivary hormones were recorded pre- and post-the 4-week training programme. **Results.** Significant improvements were observed in back squat (ECC: 17±12 kg, $d$=0.68 *moderate* effect; and CON: 12±9 kg, $d$=0.50 *small*); eccentric back squat (ECC: 24±14 kg,

*d*=0.94 *moderate*; and CON: 19±10 kg, *d*=0.68 *moderate*); and bench press (ECC: 8±4 kg, *d*=0.50 *small*; and CON: 7±3 kg, *d*=0.56 *small*), with no significant between-group differences ($p>0.05$). Also, CMJ peak power and height, and DJ contact time showed improvements (ECC: *d*=0.68-0.90 *moderate*; CON: *d*=0.02-0.33 *trivial-small; p*<0.05). No within- or between-group differences were observed in other jumping parameters, 40m sprint, 505 agility, or salivary hormones. Covariance was noted between squat strength and the salivary testosterone:cortisol ratio (r=-0.574). **Conclusions.** A short-term training emphasising either eccentric or concentric duration produced improvements in select measures of strength and power, but not speed, agility, or salivary hormones. Interestingly, the change in the testosterone:cortisol ratio over the 4-week undulating training programme was related to the improvement in 1-RM concentric squat strength.
**Conflict of Interest.** The authors declare no relevant conflict of interest in relation to this work.

**Effects of flywheel eccentric training on chronic knee injuries reconditioning: A case study**

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**Introduction.** Eccentric training has been shown to improve muscular strength, power and hypertrophy in healthy and active/athletes populations compared to conventional resistance training. Eccentric modalities are also commonly used during rehabilitation and has received much attention in recent years due to its versatility and portability. The present case study investigates the efficacy of using flywheel eccentric training as part of a conservative injury management return-to-play (RTP) conditioning program in an athlete that with chronic knee injuries. **Methods.** An elite level badminton athlete with a medial meniscus tear and chondral injury to the right knee, and MCL/LCL partial tear with chondral injury in the left knee, completed a 6-week training program that incorporated an eccentric flywheel device. The athlete trained three times per week with at least one day of rest between sessions. In each training session, following a 10-min general warm up, the athlete performed six sets of 10 repetitions of the assigned exercise (either squat or deadlift). Average force (AvF), peak concentric power (ppCON), peak eccentric power (ppECC) and relative peak power (RelPP) for each session were monitored using the kMeter mobile application. Pre and post measurements of countermovement jump (CMJ) and lower-body isometric unilateral strength were assessed. **Results.** Very large and significant improvements ($p<0.05$) were observed in AvF (Squat: +362; Deadlift: +167 N), ppCON (Squat: +353; Deadlift: +201 W), ppECC (Squat: +393; Deadlift: 200 W), and RelPP (Squat: 5.53; Deadlift: 3.14 W/kg) after six weeks of flywheel eccentric training. CMJ height (+4.2 cm) and peak force (+39 N) significantly increased ($p<0.05$), while left vs right isometric strength asymmetry decreased from 18.5% to 12%. **Conclusions.** Improvements in force and power generating capabilities were seen after two weeks of training and continual gains were sustained across the training program. The increases in CMJ height observed after flywheel eccentric training are in agreement with previous studies done on well-trained subjects. Flywheel eccentric training was effective in improving lower body strength in an elite athlete with chronic knee pain and is therefore a viable option in managing chronic knee injuries that can be incorporated into a RTP strength and conditioning program.
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**Incidence and magnitude of head impacts experienced by male adolescent rugby players: A two-season comparison**

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**Introduction.** In recent years there has been an increase in public and media awareness regarding the safety and brain health of players either after a concussion or after long-term participation in rugby union. Because of the nature of rugby, players are exposed to repeated collisions which may or may not result in a concussion. These impacts involve both linear and rotational acceleration. At present there is sparse research investigating the role of collisions in rugby on the brain health of junior rugby players. **Methods.** Forty U16 male rugby players aged 14-16 years completed pre-season and post-season assessment which included: (i) advanced magnetic resonance imaging (MRI) of the brain, (ii) neurocognitive testing, (iii) health history questionnaire, (iv) motor control questionnaire. Participants wore instrumented mouthguards during their club and school season (recording collisions 8g and above) for all games and contact trainings. The collisions were video verified and coded according to relevant descriptors. **Results.** Magnitude and incidence data for the male cohort, across two seasons, can be presented at this time. Average total incidence per team was 14.19-16.25 impacts at training and 71.95-105.4 impacts at games. Incidence range per player was 12 to 496 impacts experienced per season, with an average of 107.61. Average peak linear acceleration (PLA) was 18.15-19.17 at training and 20.08-20.63 at games.

Magnitude range per player was 13.8-28.2 g, with an average of 19.48. Player loading influenced incidence rate and maximum PLA, but not average PLA. Wider study results, expected in early 2024, will incorporate results from neuro-cognitive testing, motor control questionnaires, and MRI scans. **Conclusions.** The study highlights the need for objective data to measure head impact exposure in rugby union, especially at the junior level. Monitoring head impact loading is crucial for rugby safety and may help to establish a distinction between kinematics of concussive and non-concussive injury.
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## Our Journal – Journal of Sport and Exercise Science (JSES)

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