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The BASES Expert Statement on the Use of Music for Movement among People with Parkinson's

Prof Costas I. Karageorghis FBASES, Dr Dawn Rose, Dr Lucy E. Annett, Dr Judith Bek, Dr Lindsay Bottoms, Dr Peter J. Lovatt, Dr Ellen Poliakoff, Dr Benjamin G. Schultz, Dr Caroline P. Whyatt, Dr William R. Young and Prof Yvonne N. Delevoye-Turrell

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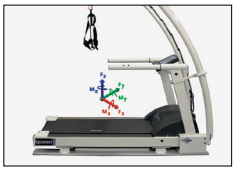

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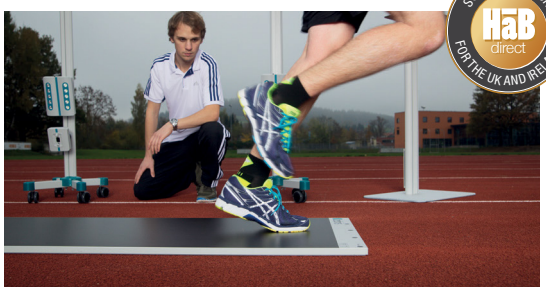

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News

Appointment of new BASES Professional Development and Partnerships Manager

BASES is pleased to announce that Sue Watson has been appointed as the new Professional Development and Partnerships Manager. She joins the Association with over 16 years' experience within the sports sector. After graduating from Loughborough University with a first class BSc in Sport and Exercise Science in 2003, she went on to become a qualified FE lecturer before diversifying into sports development and management, the fitness industry and high performance sport. Through roles in coaching and workforce management, she has vast experience in developing and managing professional development programmes and initiatives and in designing and delivering strategic plans. She also has experience in managing high performance programmes through her previous role as Performance Manager for the Derbyshire Institute of Sport. Her most recent role was Workforce and Place Lead at Active Partners Trust (one of 43 active partnerships in England, with a focus on increasing physical activity levels) where she was responsible for partnership and workforce development across Derbyshire and Nottinghamshire. As an elite athlete, she achieved 17 international caps for England and Great Britain for basketball; was the Captain of the English Universities basketball team; and won two National titles at amateur boxing before going on to compete professionally. She currently competes regularly at netball and also delivers fitness and boxing classes for the local community.

Joint BASES and The Physiological Society Sport and Exercise Science Animation

BASES is delighted to announce the launch of an exciting new animation project, to promote sport and exercise science, undertaken in collaboration with The Physiological Society. The animation was developed with help from a group of experts, responsible for ensuring scientific content contained within the resource was accurate and relevant. This expert group included Prof Mike Tipton from Portsmouth University, Dr Gladys Onambele-Pearson from Manchester Metropolitan University, Dr Steve Harridge from Kings College London, and the BASES Deputy Chair, Assoc. Prof Adam Hawkey FBASES from Solent University. Adam, who also served as the animation's narrator, commented: "This resource will help to inform and inspire the next generation of sport and exercise scientists, while enabling prospective students to better understand the breadth of roles that sport and exercise scientists undertake. It is envisioned that the animation will be utilised by schools and colleges to support students to make more informed option choices and by universities wanting to promote their sport and exercise science-related courses."
The animation is available: www.bases.org.uk/article-joint_bases___the_physiological_society_sport_and_exercise_science_animation.html

BASES Conference 2019

The Conference took place at the King Power Stadium, Leicester on 19-20 November 2019. Three hundred and fifty four delegates registered for the conference, an increase on last year. Prof Carl Foster opened the conference with a keynote on *Translating science to coaching in performance sport*. Prof Mike Weed closed the conference with a keynote on *Shifting the curve of sport and physical activity participation*. A number of parallel invited symposia took place alongside poster viewing (181 abstracts were submitted this year), exhibitions and networking. The Conference dinner saw a number of the new Fellows receiving their BASES pin and certificate. The conference concluded with the recognition of those members winning conference awards (see below).

BASES 2019 Annual General Meeting

The 2019 AGM took place on 19 November 2019. BASES Chair, Prof Richard Tong FBASES, provided an overview and report on BASES activities since the last AGM.

Heads of Department Forum

The 17th BASES Heads of Department Forum will take place on 18 March 2020 at the TechnoCentre, Coventry University. This will be a day of information, insights and networking for those with leadership roles within sport and exercise sciences academia. Further details are provided on page 23 of this issue.

BUES renewal

University of Brighton - BSc (Hons) Sport and Exercise Science
University of Ulster - BSc (Hons) Sport and Exercise Science.

CPD Endorsement

International Sarcopenia Translational Research Conference 2020 - new
Catapult Sport Level 1 - An introduction to athlete tracking using Catapult GPS devises and Level 2 - Longitudinal athlete tracking and advanced metrics using Catapult GPS devices - renewal
Certificate in Integrative Sports Nutrition - renewal.

BASES Conference 2019 Awards

Human Kinetics Student Poster Presentation Award:
Clare Strongman, Anglia Ruskin University

Human Kinetics Student Free Communication Presentation Award:
Emmet McDermott, Loughborough University

Cranlea Poster Presentation Award:
Anthony Turner, University of Edinburgh

BASES Sport and Exercise Science 5 Slides in 5 Minutes Free Communication Award:
Matthew Haines, University of Huddersfield

Routledge Recently Qualified Researcher Free Communication Award:
Anna Myers, Sheffield Hallam University

Sportesse Sport and Exercise Science Free Communication Award:
Andrew Kirkland, University of Stirling

Routledge/Taylor & Francis Sport and Exercise Science Impact Award:
James Yates, University of Bedfordshire.

BASES Conference 2019 Award Sponsors

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Diary dates

2020

1 Mar.	BASES International Conference Grant submission deadline
2 Mar.	Student Conference Abstract submission deadline.
3-4 Mar.	An Introduction to Athlete tracking using Catapult GPS devices: Level 1 and Longitudinal Athlete Tracking and Advanced Metrics using Catapult GPS devises Level 2, Leeds Beckett University – BASES Endorsed CPD
6 Mar.	BASES SE Workshop - Combined Supervisor Reviewer, Leeds Beckett University
18 Mar.	BASES Heads of Department Forum, Coventry University
18 Mar.	BASES Sport and Performance Division Event - Managing Fatigue & Enhancing Recovery, Newman University, Birmingham
30 Mar.	BASES SE Application submission opens
1 Apr.	BASES Workshop - Assessment and Development of Change of Direction Speed and Agility, Manchester Institute of Health and Performance
15-16 Apr.	**BASES Student Conference 2020, Solent University, Southampton**
17 Apr.	BASES SE Application deadline
21-25 Apr.	The Certificate of Integrative Sports Nutrition, Module 1 - BASES Endorsed CPD
1 May.	BASES Expert Statement Grants submission deadline
13-14 May.	BASES SE Workshop Package
1 Jun.	BASES International Conference Grants submission deadline
11-12 Jun.	International Sarcopenia Translation Research Conference 2020 - BASES Endorsed CPD
16-20 Jun.	The Certificate of Integrative Sports Nutrition, Module 2 - BASES Endorsed CPD
17-18 Nov.	**BASES Annual Conference 2020, King Power Stadium, Leicester**

Further information:
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Get involved in the debate by sharing your views in a letter to the Editor. All published letters will receive a £25 discount off BASES membership renewal. Letters must refer to an article that has appeared in the last issue. Letters should be no longer than 200 words (this word count includes everything, e.g. references) and must include your name. Letters may be edited or shortened for space or clarity. Please send your letter to **editor@bases.org.uk** by **26 March 2020**.

Letters

RE: Impact of Sport and Exercise Science Education on the UK Economy

The encouraging report regarding the economic and social benefit sport and exercise science graduates have on the UK economy celebrates our successful students and is something we, as sport and exercise science educators, should be proud of. However, we must remind ourselves of those students who do not achieve success, who do not graduate because they drop out. Each year 12.8% of undergraduate SES students drop out. Utilising data published in the *Impact on the UK Economy Report* (Table 1.1), this translates to 4,929 undergraduate sport and exercise science students dropping out each year and equates to £18,019,241 lost labour income to the economy per year (value excludes non-labour income and the multiplier effects - see chapter 2 of report). In an effort to further impact the number of sport and exercise science students graduating and subsequently benefitting the UK economy, sport and exercise science educators are signposted to excellent resources provided by AdvanceHE regarding how to positively impact student retention and success.

MATTHEW TIMMIS AND FRANCESCA CAVALLERIO, ANGLIA RUSKIN UNIVERSITY

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AdvanceHE: Student retention and success in higher education. Available: www.advance-he.ac.uk/guidance/teaching-and-learning/student-retention-and-success

The Physiological Society, Sport and Exercise Science Education: Impact on the UK Economy Report. Available: www.physoc.org/policy/sport-exercise-science-education-impact-on-the-uk-economy/

The BASES Expert Statement on the Use of Music for Movement among People with Parkinson's

Produced on behalf of the British Association of Sport and Exercise Sciences by
Prof Costas I. Karageorghis FBASES, Dr Dawn Rose, Dr Lucy E. Annett, Dr Judith Bek, Dr Lindsay Bottoms, Dr Peter J. Lovatt, Dr Ellen Poliakoff, Dr Benjamin G. Schultz, Dr Caroline P. Whyatt, Dr William R. Young and Prof Yvonne N. Delevoye-Turrell.

"Music makes me feel free; it makes me feel normal, like I was a puppet with my strings messed-up, and suddenly they've all been untangled."

Anon. person with Parkinson's

Introduction

Music is an artistic auditory stimulus that unfolds over time. It can prime specific actions and prompt engagement in physical activity as well as heighten motivation during motor tasks (Karageorghis, 2020). Contrastingly, it can be used to downregulate arousal to facilitate the transition from an active to a sedentary state or to ameliorate anxiety. In therapeutic applications, musical features such as rhythm, melody and harmony have been shown to elicit psychological and physiological changes (Thaut & Hoemberg, 2014).

Parkinson's is a degenerative neurological condition in which the loss of dopamine neurons results in impaired initiation and control of movement, with common symptoms including tremor, postural instability and gait disturbance. There are also non-motor effects that include apathy, anxiety and depression. Medication does not alleviate all manifestations of the condition and there is presently no known cure (Obeso *et al.*, 2017). It is notable that people with Parkinson's are estimated to be 30% less active than age-matched peers (Ramaswamy *et al.*, 2018). Nonetheless, evidence is emerging that a range of exercise-based and social activities that involve musical engagement can serve to address the common symptoms and enhance quality of life (Thaut & Hoemberg, 2014).

This statement brings together an international interdisciplinary team to outline what is known about music-related applications for people with Parkinson's, and to provide recommendations for exercise and health practitioners.

Background and evidence

Auditory and motor areas in the brain are closely linked. Notably, rhythm and tempo provide "temporal scaffolding" to help guide when, how far and how fast to move (Dalla Bella *et al.*, 2015, p.78). The sustained interest in how the rhythmic components of music can help to regulate movement in Parkinson's has led to a therapeutic strategy known as *rhythmic auditory stimulation*. Findings from related work indicate that rhythmic auditory stimulation training has a regulatory effect on walking (Dalla Bella *et al.*, 2015). This "entrainment effect" can also direct several of the body's pulses, such as breathing rate, heart rate and brain waves. Nonetheless, if people find it difficult to extract a beat or need to adapt their walking pattern to certain situations (e.g. rough ground), rhythmic auditory stimulation training can have limited applicability.

Researchers in Parkinson's have suggested that musical stimuli provide more effective auditory cueing than simple metronomic *(tick-tock)* stimuli. A recent study illustrated that the capacity to synchronise accurately depends not only on the speed (tempo) and type of auditory cue (metronome, music), but also on the type of movement being coordinated (Rose *et al.*, 2019; see Figure 1). Moreover, music can facilitate action production, leading to greater automaticity and fluency in sequential motor tasks (Karageorghis, 2020). Accordingly, people with Parkinson's have a means by which to engage in purposeful motor behaviours with less cognitive effort. Music has "groove", lyrics and affective qualities that come to the fore in social situations such as dancing. Thus, music has the potential to facilitate expressive and communicative actions as well as functional ones. Nonetheless, care must be taken when using music with lyrical content that requires semantic processing, as dual-tasking can be challenging for people with Parkinson's.

The effects of music are nuanced and multifaceted. Music triggers memories that can transport individuals back in time and

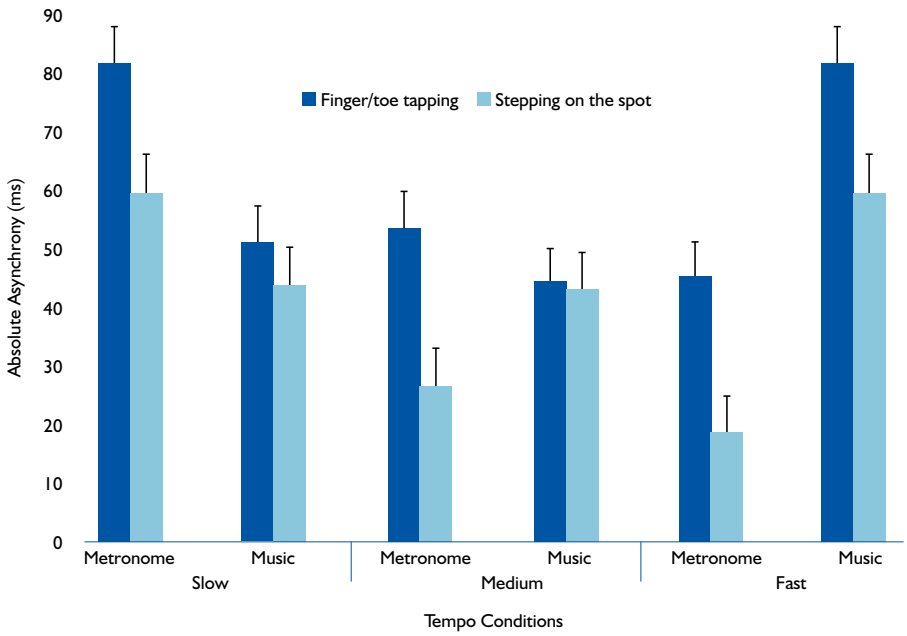

Figure 1. The differential effects of auditory cue types (metronome and instrumental music) on the ability of people with Parkinson's to synchronise small (tapping) and whole-body (stepping) movements with the perceived beat at three tempi. *Absolute asynchrony* represents the disparity between synchronisation of the timed action and the auditory target (i.e. the underlying beat). T-bars denote standard error.

connect them with significant others in a meaningful way. The familiarity of personally meaningful music may assist in the internal generation (i.e. imagination) of cues to motivate, initiate and regulate movement. Research has shown that auditory and motor imagery ("internal rehearsal") can facilitate movement production and fluency, in motor tasks such as gait (Young *et al.*, 2016) and hand movements (Bek *et al.*, 2019). As well as using pre-recorded music, the ability to deploy an "inner jukebox" could be promoted as a therapeutic strategy for Parkinson's (Rose *et al.*, 2019).

Recommendations

- Select music tracks that have a clearly extractible metre (strong beat) and avoid altering the tempi of tracks.
- Incorporate music making as well as music listening into therapeutic programmes.
- Music is a socialising force that can be used to encourage people to move together in time and space, with concomitant benefits for quality of life.
- Within group settings, consider participants' age and preferences in the formation of music programmes in order to accommodate individual needs (e.g. varying levels of movement complexity).
- Employ modern digital technologies, such as those that generate motion sensor-mediated music programmes, to facilitate the autonomous selection of music based on movement rate (i.e. *passive synchronisation*).

Future directions

- The use of digital technologies to identify and codify individuals' spontaneous motor tempo should be explored in order that this can be incorporated into therapeutic music applications.
- There is a need to examine how music can help people with Parkinson's to divert attention (i.e. facilitate dissociation) from overwhelming sensory inputs that are both external (e.g. noise, social chattering) and internal (e.g. tremor, muscle pain).
- The use of music to evoke motor imagery that facilitates movement should be explored.
- The influence of group dynamics on responsiveness to music warrants further investigation.
- Going beyond measuring single-limb body movements (e.g. finger tapping) would serve to elucidate the therapeutic benefits of music-related interventions.

Conclusions

Music for movement can be used in Parkinson's to facilitate the guidance of voluntary actions, improve engagement in physical activity, elevate motivation and enhance affective states. We hope that the detail provided herein will encourage practitioners to optimise the way in which music is integrated into their therapeutic approaches and to create a soundscape that will enable people with Parkinson's to "untangle the puppet strings." ■

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The BASES Sport and Exercise Psychology Accreditation Route (SEPAR)

Profs Richard Thelwell FBASES and Zoe Knowles FBASES report on the launch of SEPAR.

Having spent 2 years in development, with support from numerous members and potential end-users, February 2020 sees the official opening of the BASES Sport and Exercise Psychology Accreditation Route (SEPAR) for new registrants. The SEPAR is the latest Health and Care Professions Council (HCPC) approved training route for Sport and Exercise Psychologists and facilitates professional and skill development underpinned by supervised practice. Throughout their training, registrants (who can use the title: Sport and Exercise Psychologist in Training: SEPiT) will acquire knowledge, skills, self-development and experience to a competency that confers eligibility for registration with the HCPC as a Practitioner Psychologist. This article provides the headline information for those wishing to become involved in the SEPAR, be it as a candidate, supervisor and/or reviewer. More detailed information is available: www.bases.org.uk/spage-professional_development-separ.html

Length of the SEPAR

The length of SEPAR will depend on the time that registrants are able to dedicate to the qualification and the competencies that require development. As such, the SEPAR is planned to be 2, 3 or 4 years, with the intended duration being stated at the application stage. There may also be some exceptional circumstances where requests to complete SEPAR in a 1-year period can be made via Accreditation of Prior Experiential Competence (APEC).

Entry requirements

In addition to holding Graduate membership of BASES as a minimum, registrants must be able to evidence "underpinning psychology" and "MSc Sport and/or Exercise Psychology" level knowledge at the point of entry. The ways in which registrants can evidence underpinning psychology knowledge are: successful completion of an accredited Psychology course (undergraduate or conversion); completion of the 60-credit Open University module offered exclusively for potential SEPAR candidates; prior recognition of underpinning "core" psychology knowledge from a Learned Society/professional body. For the M-level qualification, most candidates will provide evidence of a successfully completed MSc Sport and/or Exercise Psychology course. However, if, for example, the completed MSc is titled as a multidisciplinary course (e.g. Sport and Exercise (Psychology)/Coaching Science) or has been completed internationally, candidates will have the opportunity to map their M-level knowledge to the relevant HCPC Standards of Proficiency.

Finally, registrants will be required to confirm their supervisory arrangements, professional indemnity, and where appropriate, evidence English language to IELTS grade 7.

The SEPAR process

Following admission to the SEPAR, the first task for the SEPiT, as shown in Table 1, is to complete their "initial" competency profile. The profile, which is an eSubmission, covers 65 competencies spread across four key areas: Knowledge, Skills, Self-Development and Management, and Experience. For each competency, the SEPiT is required to rate their current level of competence on a scale of 0-5 (ratings criteria are made explicit) and provide supporting documented evidence. They are also required to outline the target rating for the next submission with details to what their action plan, and evidence for the enhanced competence, will be. Each SEPiT will have their profile assessed by two reviewers who will provide feedback within 8 weeks.

A second "mid-point" competency profile (timing of which will vary depending on the intended registration period) will follow the same process as "initial" submission with the only exception being the inclusion of an "eMeeting" between the two reviewers and the SEPiT following mid-point submission feedback. The meeting is to discuss the "process-related," rather than "knowledge-related," aspects of their development. Submission of a "final" competency profile will take place at the end of the registration period with any shortfall in competence identified, or recommendation for SEPAR completion, provided within an 8-week period.

By the time of the "final" competency profile submission, SEPiTs will need to evidence *at least* the threshold rating of four for all 65 competencies to meet the necessary HCPC Standards of Proficiency. Although there are many aspects of supporting evidence that will span the competence areas, there are some core documents required. For example, by the end of the SEPAR, there will be submission of at least three case studies. This will include one at the mid-point submission and two at the final submission (one will focus on the client-practitioner relationship). Perhaps the most challenging requirement is the need for the SEPiT to engage in at least 3,200 hours of activity that will include 2,700 of application/consulting, 225 of dissemination and citizenship, and 275 of continued professional development, and supervisor-led activity. Table 2 provides further details.

Cost

For those wishing to register for a 2, 3 or 4-year SEPAR programme, the total amount payable to BASES is £3,050. The cost includes all registration and review fees in addition to a number of training and development activities. These include the delegate fees for the following workshops: Safeguarding; Ethics in Professional Practice; Reflective Practice; Case Study Development; 2 ½ day Counselling Skills; and two additional BASES workshops/webinars offered by BASES. The fee also includes access to the on-line BASES Mental Health in Sport training, and the Enhanced Disclosure and Barring Service (DBS) check on entry.

The cost for the APEC option prior to the February 2022 intake is £1,000. As per the full programme, the cost includes all registration and review fees, delegate fees for two additional BASES workshops/webinars offered by BASES and the Enhanced DBS check on entry.

Further, there may be a requirement for SEPiTs to incur additional costs. These are likely to include any additional training and development activities that facilitate the demonstration of full competence, supervision costs, any costs associated with placements (especially if they are being completed in a voluntary capacity), professional indemnity insurance, and the annual "update service" for DBS checks.

Supervisors

To facilitate competence attainment from training and development activities, a condition for all SEPiTs is for them to operate under supervised practice. As such, all supervisors are required to be BASES professional members, registered with the HCPC and complete all mandatory training prior to becoming a SEPAR approved supervisor. (All training documentation is held within the Members' section of the BASES website.) The supervision training comprises two on-line modules that are research and practice-led and equate to approximately 8 hours

Table 1. Overview of the SEPAR process

Time point	Candidate role
1. **By 1 February or 1 August** - candidates submit their application documentation to the BASES office. BASES commences DBS check. On receipt of all relevant application information and a clear DBS check, the BASES office will allocate a 'One Drive' folder for the candidate, supervisor and assigned reviewers.	SEPAR Application Form. Liaison with Due Diligence Checking (DDC).
2. Attendance at "Introduction to SEPAR" workshop.	N/A.
3. E-submission of SEPAR competence documentation by **1 May (Feb enrolment) or 1 November (Aug enrolment).**	SEPAR application competence document.
Reviewer feedback within 8 weeks and confirmed by the Sport and Exercise Psychology Accreditation Committee (SEPAC) in **July or January.**	
*4. Attendance at: - BASES Safeguarding workshop - BASES Ethics in Professional Practice workshop - BASES Reflective Practice workshop - BASES Case Study workshop (to be completed prior to the mid-point competence profile submission).	Completed prior to the mid-point competence profile submission. Candidate's responsibility to book his/her place on development workshops.
*5. Mid-point e-submission (12 months for 2 year; 18 months for 3 year; 24 months for 4 year).	SEPAR mid-point competence document.
Reviewer feedback within 8 weeks and confirmed by SEPAC in **July or January.**	
*6. E-meeting between review team and SEPiT.	1-hour reviewer/candidate meeting.
7. Final e-submission (2, 3, or 4 years after initial submission date).	SEPAR final competence document.
Reviewer feedback within 8 weeks and confirmed by SEPAC in **July or January** where a final DBS check will take place. Completion of SEPAR reported at the next available Accreditation Committee.	
8. Following confirmation at the SEPAC, candidates are eligible to apply for BASES Accreditation and eligible to apply for registration with the HCPC.	
9. On confirmation of HCPC registration, candidates can label themselves as "SEPAR completed" and as an **HCPC Registered Sport and Exercise Psychologist.**	

* Not required by those registered under the APEC process.

of study time. Successful completion of the first two modules through workbook submission and approval confers eligibility to the SEPAR Supervisor Register. A third "self-paced" module requires supervisors to engage in ongoing development and reflection with evidence of such activities needing to be available every 3 years.

Quality assurance

Whilst the Supervisory role is to support SEPiTs to develop their competence to be able to evidence the HCPC Standards of Proficiency, the achievement of the HCPC Standards of Education and Training is via a number of quality assurance procedures. The two most prominent relate to Reviewers and External Examiners. SEPAR Reviewers are required to be BASES professional members, registered with the HCPC and complete all mandatory training prior to becoming a SEPAR Approved Reviewer. Each SEPiT will have two reviewers throughout their SEPAR journey with the reviewer role being to assess competence profiles at the initial, mid and final stages of the SEPAR process and conduct the mid-point meeting (via eFormat) to discuss progress. There is also normally a requirement for the reviewer to follow the SEPiT through to the end of the SEPAR process.

To meet the HCPC requirements for quality assurance monitoring, two External Examiners serve the SEPAR. External Examiners will be HCPC registered, prepared to serve for an appointment period of 4 years, submit one annual report per year and attend one SEPAR committee meeting per year.

So there we have it!

We have arrived at the start line and what an interesting, challenging and exciting journey it has been to date! Many people deserve thanks, not least those who have provided feedback following talks at Division of Psychology member days, and the numerous end-users and "significant" others who gave their support prior to, and at, the HCPC Approval Event.

Table 2. Overview of the minimum expected hours

Activity type	Minimum hours	Minimum days
Application/consulting	2,700 (900 actual hours)	338
Dissemination and citizenship	225 (75 actual hours)	28
CPD and supervisor-led activity*	275	34
	3,200	**400**

* A minimum of 50 hours to be with the supervisor with at least 20 hours of the 50 being observed work of the candidate.

We also wish to thank Prof Chris Harwood FBASES for his overall contribution to the SEPAR, the work stream leads (Prof Brendan Cropley FBASES, Dr Mustafa Sarkar and Dr Hayley McEwan), the training and development material developers (Dr Nichola Kentzer, Dr Paul Gorczynski, Dr Anthony Papathomas and Dr Jonathan Katz FBASES); and our two inaugural external examiners (Dr Mark Uphill and Rebecca Symes). ■

Prof Richard Thelwell FBASES

Richard is a Professor of Applied Sport Psychology and Head of School of Sport, Health and Exercise Science at the University of Portsmouth. He is a HCPC Registered Psychologist and a BASES accredited sport and exercise scientist.

Prof Zoe Knowles FBASES

Zoe is a Professor of Engagement and Learning at Liverpool John Moores University, a HCPC Registered Psychologist and Chair of the BASES Division of Psychology. She is a BASES accredited sport and exercise scientist.

Reviews - books and podcasts

The Exercising Female: Science and its Application

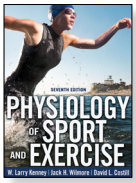
Forsyth, J. & Roberts, C. (2018)
Routledge
Hardback £120.00
and Kindle £44.99 from www.amazon.co.uk

I received the new book titled *The Exercising Female, Science and its Application* and couldn't wait to get started on reading it. It's the first of its kind, and is everything it is made out to be; making it a perfect read for anybody interested in knowing more about the exercising female. It provides a very detailed and comprehensive update on information relating to the exercising female and most importantly the application of science into the real world. It covers topics including adolescence, immune function, pregnancy, menopause and many more. The lay out of the book makes it easy to read, so I could simply jump in and out of it as and when I had time. Above all, the most important message that I was left with following reading this book, is the importance of sport and exercise science research in females, as there is still so much more to learn and understand.
DR JESSICA MEE, UNIVERSITY OF WORCESTER
Rating 8/10

Cardiopulmonary Exercise Testing in Children and Adolescents

Rowland, T. (2017)
Human Kinetics
Hardback £72.99
and Kindle £62.99 from www.amazon.co.uk

This new, updated version expands upon the author's earlier book, *Pediatric Laboratory Exercise Testing: Clinical Guidelines*, and predominantly focuses on the importance of differentiating between exercise testing in children, to adults. It is structured in parts, initially covering the underpinning physiology and subsequently: 1) exercise testing methodology (including ECG, $\dot{V}O_2max$ and pulmonary function); 2) exertion-based applications (including heart disease, dyspnoea and fatigue); and 3) testing special populations. This is a "go to" reference book that is highly comprehensive and builds on decades of evidence-based observations in clinical testing. Each chapter is divided into succinct sub-sections, which allows the reader to easily navigate and digest key information from each. I found the personal recommendations of the authors most effective in bringing the core text to life, particularly in terms of their own professional experience. The book provides a wealth of information on validated exercise testing protocol, established from decades of research and practice. Although there is little of debate, activities or additional resources, this is a comprehensive textbook for undergraduates (in physiology and protocols), postgraduates, researchers and practitioners (in protocols), that should be a staple for anyone performing exercise testing of children and adolescents.
DR JAMES GAVIN, UNIVERSITY OF SOUTHAMPTON
Rating 7/10



Physiology of Sport and Exercise (7th Edition)

Kenney, W.L., Wilmore, J.H. & Costill, D.L. (2019)
Human Kinetics
Hardback £92.42 and Paperback £72.99
from www.amazon.co.uk

The *Physiology of Sport and Exercise* is a welcomed update and an essential textbook for undergraduate courses. It comprehensively covers a range of topics with a novel web-study guide to support reading and learning. The "key terms," "study questions" and "study guide activities" section that follows each chapter will provide students with the chance to ensure that they have understood the content whilst also providing teaching material for higher education. The "in-review" sections nicely summarise each topic and make the topics more digestible to the reader. There are bright, colourful diagrams throughout, along with some new pictures that demonstrate how physiological research has evolved. "Research perspective" sections provide articulate topical summaries of classic and new research and ensure the reader can grasp summative understandings of topics throughout the book. Overall, there is no doubt it will be a classic and essential textbook for teaching undergraduate students - given it covers a vast amount of physiological topics, providing historical and essential information throughout.
MATTHEW ELLIS, NEWMAN UNIVERSITY BIRMINGHAM
Rating 9/10

The Sport Psych Show

This is hosted by sport psychologist, Dan Abrahams; a former professional golfer with an MSc in sport psychology. Each episode features guests from a range of backgrounds from elite level players to high performance coaches, sport psychology consultants and researchers, who all agree that psychology plays a vital role in sporting success. The podcast usually starts with the guests informing the listener about their career history. This experience provides context for the authentic discussion that follows regarding pertinent topics within the field (e.g. the coach-athlete relationship). Dan's calm and engaging demeanour puts guests at ease. The eloquent use of metaphors and phrases from guests (and Dan) gives the listener a better understanding, from a behavioural point of view, of what the brain does and why and how this knowledge is integrated into practice. The conversations provide unique perspectives on sport psychology philosophies, tools and techniques that positively impact participation, progression and performance in sport. Every episode is filled with valuable nuggets of information. The podcast 100% delivers on its aims of demystifying sport psychology for players, coaches and parents and, as such, is a valuable resource for all those involved in the coaching process.
GAVIN THOMAS, UNIVERSITY OF WORCESTER AND MATTHEW SHAW, WESTERN NORWAY UNIVERSITY OF APPLIED SCIENCES
Rating 10/10

BASES members can find relevant apps to their field, read reviews and review apps by visiting **www.ourmobilehealth.com/#login**

Send books for potential review to The British Association of Sport and Exercise Sciences, Leeds Beckett University, Rooms G07 & G08, Fairfax Hall, Headingley Campus, Leeds LS6 3QS
Want to be a book reviewer? Email enquiries@bases.org.uk Reviewers get to keep the book in return for a 200 word review

An interview with Ian Wilson - the new BASES Executive Director

Where have you worked previously?
I have a lifetime passion and involvement in sport, as an elite athlete, national swimming Team Manager, various management roles within the UK Sports Institute, the English Institute of Sport, Sports Coach UK, British Swimming and UK Coaching. My drive for excellence, success and results stems from my years as a former International Swimmer, where I was on the National Team for 14 years. I finished 5th at the 1992 Barcelona Olympic Games over 1500m Freestyle and won World and European medals during my sporting career.

Why did you choose to apply for this role?
I was excited about the role when reading the Person Specification and Job Description, believing they were an ideal fit for my knowledge, skills and experience. There were many things about the role that appealed to me; I thought the role would allow me to apply my leadership and management skills and experience to deliver the current 2015-2020 Strategic Plan and to develop the next 5-year Strategic Plan.

I am very much a people-person and my personal values align to the values of BASES. I have some history with BASES; in March 2004, I was a reviewer on the World Class Guarantee Accreditation programme, working with Dr Andy Jones and Prof Dave Collins to review three submissions.

As an international swimmer in the 1980s and 1990s, I accessed a little bit of sports science support - physiology and nutrition. I vividly recall training at Newcastle Road baths in Sunderland (long since knocked down) and having blood taken from my wet ear by Dr Malcolm Robson as part of my lactate testing. Who would have thought a small ear lobe could bruise so badly! Peggy Wellington supported my nutrition in the build up to the 1992 Olympic Games and I fondly remember completing my food diary and having that analysed.

Fast forward 20 years and I was Manager, Daily Training Environment for British Swimming. I oversaw the five Intensive Training Centres over the London Olympic cycle. Then, our world class athletes and coaches had access to a breadth of quality sport science support, including biomechanics, nutrition, physiology, psychology and video analysis.

What do you think you can you bring to BASES?
The Executive Director role requires a broad range of skills and experience. I am a highly motivated, well-planned and organised individual whose colleagues and line managers have fed back on my ability to successfully multi-task, prioritise work and achieve success in sometimes tight timescales.

My recent role was Head of Operations at UK Coaching, a sport and physical activity charity, and Coachwise Ltd, their trading company. I reported directly to the Chief Executive Officer and ran the Operations Department to develop, lead and manage the Group's ongoing operations and procedures. I was responsible for the efficient operation of the business and worked closely with the Executive Directors of the Corporate Management Team and colleagues in the Senior Management Team to develop, deliver and monitor a wide range of operational and strategic programmes, projects and initiatives.

I am keen to continue delivering the forward-thinking leadership that my predecessor, Tom Holden, developed at BASES, and I hope I can bring some new ideas and ways of working from my own sporting and professional experience.

What do you see as your main responsibilities within the role?
Ultimately, my role is to ensure the effective day-to-day management of the Association under delegated authority from the Board, and to develop and deliver on the BASES Strategic Plan in the most effective and efficient manner, providing regular updates and reports to the Board. My role includes the operational, administrative and financial management of the BASES office and overseeing all of the day-to-day duties that my team carries out. I will provide ongoing support to the team to help them continue delivering the high-quality services to our members.

How have the first few months been for you?
I started in mid-October and was fortunate to have a good hand-over and induction period with Tom Holden. That said, I did hit the ground running, attending my first Board meeting, AGM and annual conference in November. I soon went out to recruitment for a new Professional Development and Partnerships Manager, with Sue Watson starting in that role from mid-January. I quickly picked up the 2021-2025 Strategy advancement and started a governance review, which saw the recruitment for new independent Non-Executive Directors in December. We launched the new Sport and Exercise Psychology Accreditation Route (SEPAR) in January (more details on page 8 of this issue), and I shared details with a broad range of partners and stakeholders, so that employers, end-users and sport psychology practitioners are all aware of this new programme of professional development, skill acquisition and supervised practice.

We are a small operational team at BASES, and I am taking time to get to know my colleagues and their work programmes and priorities. Every day is a school day and I am learning more about the Association and its work.

I am keen for the Association to continue to seek ways to grow and improve. Gaining an in-depth understanding of the needs and opinions of current and potential members will be key to this and is a high priority. Continuing to deliver a world-class annual conference, growing the membership and further developing the standards and accreditation programmes will all be key to the current and future strategy of BASES.

What do you enjoy doing in your spare time?
I enjoy the sunshine and try to get abroad two to three times a year for a relaxing break. I go to the gym each morning before work and do some coaching a couple of times a month at the City of Sunderland Swimming Club, when I am up in the North East visiting family. I have been a Non-Executive Director of the Club since November 2012 and its President since the early 2000s.

What is your claim to fame?
I have a couple! First, I was the fastest non-Australian in the world over 1500m Freestyle in 1994! I finished fourth at the 1994 Commonwealth Games in Victoria, Canada, behind three awesome Australians. At the year-end world rankings, only those three Aussies were ahead of me on the global rankings. Second, my elder sister, Lynne, competed in the 200m Butterfly at the 1988 Seoul Olympic Games. At one time in the late 1980s, we were the only brother and sister selected on the national swim team together. ■

Ian Wilson

Ian is the BASES Executive Director

Exer-size with *PACE* provokes controversy

Prof John Saxton FBASES is the physical activity for health columnist for The Sport and Exercise Scientist.

Raising public awareness of physical activity energy expenditure in the context of food labelling and consumer food choices is a topic that sparked a vociferous debate on social media platforms at the end of 2019. This was prompted by publication of a systematic review on physical activity calorie equivalent (PACE) food labelling (Daley *et al.*, 2019), which received significant media attention, spearheaded by the BBC headline: *'Four hours to walk off pizza calories' warning works, experts say* (BBC News Website [1]). The underlying premise is that by raising awareness of the calorie content of common foods in relation to the amount of physical activity needed to expend those calories, PACE labelling would enable consumers to make more informed food choices - thereby helping to combat population obesity. For example, telling consumers it will take 16-times longer to walk off a pizza than a salad (4 hours versus 15 minutes) would help them to decide whether choosing the more calorific option is worth that amount of physical effort! Direct association with energy balance and physical activity distinguishes this approach from other food labelling strategies, which the authors believe could serve as a continual reminder of the importance of being regularly active.

The evidence in favour of PACE labelling is still fairly scant, although a meta-analysis of 12 studies included in this systematic review showed that its use on food items and menus in comparison to no food labelling resulted in approximately 100 fewer calories being selected. However, corresponding meta-analysis data for calories consumed (-109 kcal) were based on only two studies and PACE labelling was shown to be no more effective in reducing food calories selected or consumed than other food labelling strategies in current use (e.g. traffic light system, percent daily calories, nutritional labelling, etc.). Uncertain risk of study bias, variability of study designs (high heterogeneity) and lack of long-term food choice data were acknowledged as key limitations. In addition, most of the included studies involved hypothetical food selection/eating scenarios via on-line surveys or experimental designs that did not take into account the impact of food pricing or marketing at the point of purchase.

Nonetheless, on the basis of this evidence synthesis, the authors concluded that PACE labelling does have potential to reduce the number of calories consumed at the general population level, thereby helping to prevent obesity (Daley *et al.*, 2019). The Royal Society for Public Health (RSPH) moved swiftly to endorse the evidence presented in this review, while also calling for more research in real-life settings and stressing the importance of remaining sensitive to the potential negative impact that implementation of PACE labelling could have on vulnerable individuals (RSPH Website).

The ensuing social media cacophony however, was far less complaisant with its scepticism of the likely effectiveness of PACE labelling and depth of feeling about the potential damage that could be left in its wake. At its crescendo were worries about the impact such food labelling would have on individuals with eating disorders, whose feelings of guilt or shame about their food choices and/or body image could be triggered or magnified (BBC News Website [2]). Similar concerns have previously been levelled at other systems of food labelling, though there is limited research evidence to support this contention (Roberto *et al.*, 2013; Haynos & Roberto, 2017). Other dissenting voices condemned the trivialised portrayal of physical activity as a mere energy-burning *antidote to food* (disregarding its manifold health benefits); and in contrast to the views of the study authors, some expressed dismay that healthy food choices would actually become driven by an exercise-avoidance mentality - or conversely, that being physically active would become the justification for unhealthy food choices.

Critics also wondered how the 2,000-2,500 daily calories needed to maintain normal physiological functioning and the nutritional value of energy consumed fits with the logic of PACE labelling. In this respect, encouraging overweight and obese individuals to replace the calories contained in ultra-processed sweets and snacks with more wholesome (nutrient-dense) food choices was seen as a more important message to promote than making them feel they have to earn their food by *burning-off* every calorie consumed. Finally, the point was made that PACE labelling fails to consider people who are unable to run or walk.

This feisty social media backlash eclipsed an abundance of good intent that was grounded in a robust systematic evaluation of the current evidence-base. The underpinning rationale of increasing energy balance awareness to make people think twice about unhealthy food choices (and consumption of excess calories) makes perfect sense. Furthermore, even small reductions in calorie consumption at the population level, which PACE labelling might help to promote, could positively impact the prevalence of obesity.

However, the intensity of emphasis on energy balance also creates a double-edged sword with potential to overshadow important messages about physical activity being much more than energy expenditure and healthy eating being much more than calories consumed. A key question is whether PACE labelling has the legs to get more people moving when there is an inherent risk of depicting physical activity as a consumption tax rather than an investment in health. The potential dangers of PACE labelling for vulnerable individuals with eating disorders are also unknown. More research and real-life road testing are clearly needed to address these issues and inform decisions about whether this food labelling approach could have a role to play in public health strategies for tackling population obesity. ■

Prof John Saxton FBASES

John has been researching the important role that physical activity plays in the prevention and management of chronic non-communicable diseases for two decades. He is a BASES accredited sport and exercise scientist.

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Emergence of sport psychology within eSports

Drs Claire Rossato and Nataniel Boiangin provide some brief comments on eSports regarding sport psychology.

Electronic Sports (eSports) started in the early 1990s and is said to rely heavily on the launching of the worldwide web (www) in 1989 (Jonasson & Thiborg, 2010). eSports has become increasingly popular with recent symposiums featuring at sport and exercise psychology conferences (Ramirez *et al.*, 2019; Ramirez, 2019).

Research has examined the viability of eSports and its classification as a form of sport (Jonasson & Thiborg, 2008). Seth and colleagues (2017) stated that most videogames do not require gross motor movements. However, Jonasson and Thiborg (2008) noted that eSports requires coordination and that psychological aspects of eSports are associated with performance. With recent media attention, such as the story of 15-year-old Jaden Ashman who won $2.25million (£1.8m) after coming second in the Fortnite World Cup finals (BBC, 2019), popularity within professional eSports competition is growing. Furthermore, the psychology of eSports is becoming more recognised (Bányai *et al.*, 2019). This could possibly lead to further strands of employability for those who are training or are already qualified sport and exercise psychologists.

Psychology of eSports

Himmelstein *et al.* (2017) suggested that for successful performance, eSports players need to have a great knowledge about the video game, think strategically and make fast and smart decisions, be motivated to keep moving forward, be able to separate daily life from performance, avoid being distracted, stay focused, cope adaptively and maintain a growth mindset (i.e. positive attitude). Furthermore, barriers related to elements of optimal performance related to confidence issues, inadequate coping strategies, past achievement and mistakes and lack of self and team development (including team communication and team dynamics). Regarding these suggestions, the attributes listed are very similar to those that relate to the psychology of sports performance and therefore the role of a sport and exercise psychologist could help to aid in achievement of optimal performance.

Future considerations

As the eSports market continues to evolve, so does the mental performance practitioner. As discussed, attributes related to successful eSports performance are similar to those that practitioners would normally cover; however, the method and delivery of the session may rely more on virtual consultations, due to the environmental conditions surrounding eSports (e.g. athletes not all in one location, travel, etc.). When providing virtual consultations, Cottrell and colleagues (2019) suggest that eSports consultants should start to think about ethical considerations that may arise when working with an eSports team. For instance, understanding the use of the technology to be incorporated within consultations and securing confidentiality for effective and ethical service provision.

We acknowledge that this is a brief article, however, it highlights some similarities between eSports and traditional sports. More empirical evidence is needed to further determine what makes an eSports athlete (psychologically and physiologically) successful, what are the needs of the individual and team, and best practices in service delivery. Regarding recent emergence, eSports should be considered in the role of the sport and exercise psychologist. ■

Dr Claire Rossato

Claire is a Chartered Psychologist, BASES accredited sport and exercise scientist and Programme Director of the MSc in Sport and Exercise Psychology at the University of Greenwich. Her research explores stress appraisals within performance psychology.

Dr Nataniel Boiangin

Nataniel is an Assistant Professor at Barry University and a Certified Mental Performance Consultant. His primary focus as a researcher and applied practitioner is on improving visual perceptual processes for more efficient decision-making.

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BASES 2020 Conference Abstract guidelines

BASES invite abstracts in the following sport and exercise science-related themes.

1. Biomechanics and Motor Behaviour
2. Physical Activity for Health
3. Physiology and Nutrition
4. Psychology
5. Sport and Performance.

The deadlines for abstract submissions are:

- Free communication presentation deadline: ***Friday 15 May 2020***
- Poster and 5 slides in 5 minutes free communication presentations deadline: ***Friday 12 June 2020.***

Abstracts should be no more than 400 words, containing no tables or figures, sub-headings or paragraph breaks. Word counts are calculated using the word count tool in Word. Abstract title, authors and institutions are not considered in calculating the wordage.

Studies using qualitative and/or quantitative methods are invited.

Meta-analyses and systematic reviews are invited, but literature reviews are not permitted.

On the on-line submission form the presenting author, on behalf of all of the authors, needs to declare that the material submitted is original and unpublished, and that it is not under consideration for presentation elsewhere. The only exception to this is that BASES student members are allowed to submit the same material to both the BASES Annual and Student Conference in the same year.

All accepted conference abstracts will be published in an online supplement of the *Journal of Sports Sciences*. Free-access will be available upon publication of the supplement, until 31 December 2020, at www.tandfonline.com/rjsp. From 1 January 2021 onwards, BASES members can gain online access to the supplement, as well as the current volume of the *Journal of Sports Sciences*, by subscribing at the discounted rate of: £70 for regular member; and £29 for student members.

Published on behalf of BASES, in partnership with the World Commission of Science and Sports, and in association with the International Society for Advancement of Kinanthropometry, *Journal of Sports Sciences* publishes articles of the highest standard.

2018 Impact Factor: 2.811 Ranking: 20/83 (Sport Sciences)

Types of abstracts

Two types of abstracts are available:

1. **Scientific communication.** A scientific communication is an opportunity to share findings from scientific research.
2. **Applied practice.** An applied practice presentation is an opportunity to share findings from applied practice. The presentation could include findings from or reflections on applied work. These sessions should be particularly useful for practitioners and those members on supervised experience and/or seeking re-/accreditation. The aim of such abstracts is to allow practitioners to broadcast evidenced-based practice. As such, there should be clear evidence that the work is underpinned by theory and research. The needs analysis undertaken to determine the client's requirements and the content of the resulting support/intervention package should be explained. The results should be presented in a format that is not only practically relevant but academically defendable. Authors are encouraged to explain how the results of the work have contributed to knowledge and practice in the field.

Format of presentation

Three presentation formats are available:

1. **Free communication presentation** - a 10-minute presentation of your work followed by questions, in a chaired session with other presenters. For programming reasons, slots for free communication presentations are limited and preference will be given to those demonstrating excellence in terms of originality, significance and rigour.

2. **Poster presentation** - your poster will be displayed with others and the times you will be available to discuss your work with delegates will be published in the programme.

3. **5 slides in 5 minutes free communication presentation** - this presentation format entails a 5 minute presentation of empirical results followed by 2 minutes of questions in a chaired session of short communications. Preference will be given to presentations of a short study that demonstrates an important finding, a replication or a validation of a method.

Number of submissions from each person and research team

To assist with programming, each person is only permitted to submit an abstract as first named author for **one** free communication presentation and **one** poster presentation. Normally only **two** abstracts from any **one research group** may be presented.

The first named author must present the abstract.

Presenters must pay the delegate fee for the conference by specified deadlines. Otherwise their abstracts will be withdrawn from the conference programme and not included in the online supplement of the *Journal of Sports Sciences.*

Abstract proofs

Authors of accepted abstracts will be emailed a PDF of the abstracts for checking and asked to advise of any required corrections by a set deadline. Corrections must be limited to answers to queries, typographical and essential corrections only. Once the deadline has passed then changes cannot be made to the abstract.

Abstract review process

Abstracts will be reviewed and authors will be notified of one of the following decisions:

1. Accept
2. Accept with minor amends
3. Reject.

1. Abstract format guidelines

1.1 The following guidelines are designed to assist authors prepare their abstracts. Because of the differences across research methods, there is no one prescribed format for an abstract. Authors are encouraged to use a format most appropriate for the methods used.

1.2 Authors must adhere to the *Journal of Sports Sciences* guidelines for authors, extended guidelines are available at: www.tandfonline.com/action/authorSubmission?journalCode=rjsp20&page=instructions

1.3 Some important style points include:

- British English spelling and punctuation is required.
- Please use double quotation marks, except where "a quotation is 'within' a quotation".
- Present dates in the format 20 December 2012.
- Abbreviations, units and symbols should conform to Systeme International d'unites (SI units).
- For all abbreviations other than units, write the word or words to be abbreviated in full on the first mention followed by the abbreviation in parentheses.
- Avoid the use of non-standard abbreviations within the text.
- Use capital and italic "P" for p values; use "years" not "yrs"; use "min", "h", "s" for minutes, hours, seconds. See extended style guidelines online for more information.

1.4 Authors are encouraged to include social media contact details, such as Twitter handles, as part of their correspondence details.

1.5 An example abstract is provided overleaf. It is anticipated that most abstracts will follow the format of:

a) A *title* that should be concise and reflect the work being described. Only the first word begins with a capital letter, unless a proper noun is used. Do not include any acronyms in the title.

b) *Author names and affiliations* formatted as per the example abstract. Please also provide an email for the corresponding author and a Twitter handle here if they wish for it to be associated with the abstract.

c) A *brief introduction* in which the authors need to present the theoretical and/or empirical framework that the study builds upon, or is related to.

d) All research should have an *aim/purpose*, which should outline the principal objectives and scope of the study. For a quantitative research design that tests a specific hypothesis, it might be: "Therefore, the purpose of this study was to investigate the influence of A on B". It should be emphasised that the authors are encouraged to state the purpose of the work concisely and if the purpose was exploratory, then this should be stated.

e) The *methods* section describes how sample sizes were determined and how data were collected and analysed so that other researchers could repeat the research. Please use the term 'participants' (not 'subjects'). There needs to be a statement indicating that ethical approval was granted. For example, "With institutional ethics approval…" Metrics by which outcomes of analyses are to be evaluated should be stated. Preferred metrics are effect sizes or confidence intervals of differences/change rather than probabilities.

f) Authors must provide a clear explanation of their *results* and are encouraged to use the most appropriate format to do this. Quantitative researchers should report effect sizes and *P* values (e.g. $P = 0.048$). $P < 0.01$ is appropriate for values exceeding 3 decimal places (e.g. $P = 0.000021$). The number of decimal places a *P* value is reported to depends on the statistical analysis undertaken and what is being measured and its meaningfulness. Thus, an author could report *P* values to 2 and 3 decimal places in the same abstract, but in different analyses. Qualitative researchers are encouraged to use themes and/or quotations to illustrate their findings.

g) In the *conclusion* authors must conclude the relevance of their findings in relation to existing knowledge. This could be theory, research, and/or practice. Authors are encouraged to provide clear recommendations on the value of their work and reflect on the extent to which findings relate to one or more educational, professional development or applied issues for sport and exercise scientists. The concluding sentence should provide a clear "so-what?" i.e. a statement of how knowledge has been advanced or practice should be changed.

1.6 The font should be Arial size 12. Statistical abbreviations should, normally, be italicised (e.g. *t*, $P < 0.05$), with vectors (e.g. *v*) in italic typeface.

1.7 References must be kept to an absolute minimum and must be used only if essential. When used, any references must be incorporated into the text of the abstract. The required style of referencing for abstracts is shown in section 2.

2. Referencing

Referencing must follow the APA reference guide provided at: www.tandf.co.uk/journals/authors/style/reference/tf_APA.pdf

The following are examples illustrating the referencing method to be used.

2.1. The resultant hand forces were calculated and projected onto the forward direction (propulsive force) for each phase of the stroke (Schleihauf, A.A., 1979, In J. Terauds & W. Bedingfield (Eds.) *Swimming III* (pp. 300-316). Baltimore, MD: University Park Press). [This illustrates the citation of a paper or chapter in a book].

2.2. A 1% treadmill grade was used, after the recommendations of Jones and Doust (1996, *Journal of Sports Sciences*, 14, 321-327). Our findings were similar to those previously reported (e.g. Jones & Doust, 1996). [This illustrates the first and second citations of a journal paper].

2.3. Propelling efficiency was defined as ... (Toussaint, 1988, *Mechanics and energetics of swimming*. Amsterdam: Rodopi). [This illustrates the citation of a book].

2.4. The differences between groups for the nine release parameters from Best *et al.* ([1993]. *Journal of Sports Sciences*, 11, 315-328) ... [This illustrates the citation of a source, here a journal paper, with more than two authors].

Acknowledgements: Dr Claire Hitchings FBASES, Prof Clyde Williams OBE, FBASES, Prof Edward Winter FBASES and James Munro.

BASES 2020 Conference An example abstract

Influence of cold-water immersion on indices of muscle damage after prolonged intermittent shuttle running

DAVID M. BAILEY[1*], SAMUAL J. ERITH[2], P. JONATHAN GRIFFIN[3], ANTHONY DOWSON[4], DANIEL S. BREWER[4], NICHOLAS GANT[5] & CLYDE WILLIAMS[4]

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[4]Loughborough University and [5]University of Auckland
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Start of introduction, 1.5c

Cold-water immersion (cryotherapy) can aid recovery from muscle-damaging exercise (Eston and Peters, 1999, *Journal of Sports Sciences*, 17, 231-238). Participation in sports that involve prolonged periods of variable-speed running frequently result in damage that is reflected in delayed onset of muscle soreness. Therefore, the aim of this study was to assess effects of cold-water immersion on indices of muscle damage after the completion of the Loughborough Intermittent Shuttle-Running Test (LIST) (Nicholas and Nuttall, 2000, *Journal of Sports Sciences,* 18, 97-104). Participants performed six 15-min blocks of activity that included walking, jogging, cruising and sprinting in a pattern that is common in sports such as football. Completion of the LIST results in muscle damage and soreness (Thompson, Nicholas and Williams, 1999, *Journal of Sports Sciences,* 17, 387-395). With institutional ethics approval, 20 men (mean age: 22.3 ± 3.3 years; stature: 1.80 ± 0.05 m; body mass: 83.7 ± 11.9 kg) (mean ± s) completed 90 min of the LIST protocol. After exercise, participants were randomly assigned to either 10 min cold-water immersion (10 ± 0.5 °C) (*n* = 10) or a non-immersion control group (*n* = 10). Ratings of perceived soreness, changes in muscle function and efflux of intracellular proteins were assessed before exercise, during treatment and at regular intervals up to 7 days after exercise. Exercise resulted in severe muscle soreness, temporary muscle dysfunction, and raised serum markers of muscle damage. All peaked within 48 h after exercise. Cryotherapy administered immediately after exercise reduced muscle soreness at 1, 24, and 48 h ($P < 0.05$). Decrements in isometric maximal voluntary force of the knee flexors were less after cryotherapy at 24 (12 ± 4%) and 48 h (3 ± 3%) than without (21 ± 5%) and mean 14 ± 5% (mean ± sx) respectively; $P < 0.05$). Exercise-induced increases in serum myoglobin concentration and creatine kinase activity peaked at 1 and 24 h, respectively ($P < 0.05$). Cryotherapy had no effect on the creatine kinase response, but reduced myoglobin 1 h after exercise ($P < 0.05$). The results suggest that cold-water immersion immediately after prolonged intermittent shuttle running reduces soreness and indices of exercise-induced muscle damage and could be a useful aid to recovery.

Correct referencing method, do not use abbreviated Journal Titles (see section 2 for examples)

Start of aim/ purpose, 1.5d

Start of method, 1.5e

There should be a statement indicating that ethics approval was granted

Start of main measurements

Start of results, 1.5f

Start of conclusions and recommendations, 1.5g

Checklist

- ☐ The abstract is no more than 400 words, contains no tables or figures, sub-headings or paragraph breaks.
- ☐ Abstract title.
- ☐ Author names (no titles such as Prof/Dr/FBASES).
- ☐ Authors' affiliations/institutions. Please don't include departments.
- ☐ Corresponding author's email address.
- ☐ Corresponding author's Twitter handle (optional).
- ☐ The abstract contains: a brief introduction to the study; aim/purpose; participants, design and methods and treatment; main measurements; results (effect sizes and confidence intervals of difference/change are preferred to *P* values); conclusions and recommendations.
- ☐ A statement indicating that ethics approval was granted.
- ☐ References are in the correct format.

Should endurance runners reduce their ground contact time and stiffen their legs to minimise metabolic cost?

Drs Izzy Moore and Kelly Ashford detail the effects of manipulating ground contact time and leg stiffness on metabolic cost during running.

Introduction
Minimising the metabolic cost of endurance running at submaximal speeds is an important goal for trained, endurance runners. While this area has received much attention in the last 40 years, studies examining running gait typically focus on comparisons between individuals rather than examining if individuals are moving with an optimal gait.

Conclusion
Both GCT and leg stiffness appear to be self-optimised gait characteristics in trained runners. Therefore, it is not recommended that all runners aim to reduce GCT and increase leg stiffness to minimise metabolic cost. Instead, an individual assessment should be undertaken to determine an athlete's deviation from optimal. Additionally, runners appear to operate within a narrower band of optimal GCT than optimal leg stiffness, meaning GCT seems to hold greater importance than leg stiffness for optimal movement criteria.

It is not recommended that all runners aim to reduce GCT and increase leg stiffness to minimise metabolic cost. Instead, an individual assessment should be undertaken to determine an athlete's deviation from optimal.

Do we move in a way that incurs the smallest metabolic cost?
Self-optimisation is the subconscious fine-tuning of running mechanics to minimise metabolic cost. Seminal research in the area examined if trained runners self-selected a stride length that minimised metabolic cost by altering stride length (Cavanagh & Williams, 1982). A U-shaped relationship was observed, such that the self-selected stride length was the lowest point on the curve. This point is the minimal metabolic cost.

An individual's self-selected stride length can be produced by using different ground contact times (GCT). Yet, there are many conflicting findings regarding the relationship between metabolic cost and GCT (Moore, 2016). Despite this, shorter GCTs are often encouraged by coaches. Even less is known about the effect of leg stiffness upon metabolic cost, but it is often suggested that greater leg stiffness is beneficial due to the potential for greater storage and release of elastic energy.

Manipulating ground contact time and leg stiffness
Receiving the BASES Early Career Grant provided us with an opportunity to explore how metabolic cost was affected by changes in GCT and leg stiffness at an individual level. Ten trained runners ran at their preferred stride length, whilst simultaneously altering GCT. All participants completed two runs with GCTs quicker than their preferred GCT and two with slower GCTs than their preferred. In doing so, leg stiffness would need to be modulated to generate changes in GCT.

Identifying optimal gait
An identifiable minimum metabolic cost for GCT and leg stiffness was present for all participants, and all participants (except one) were within 5% of their mathematically optimal metabolic cost for both variables. The observed U-shaped relationship showed GCT to have a very narrow deviation from the base point of the curve, whilst leg stiffness had a much broader deviation (see Moore *et al.*, 2019 for full details). Interestingly, while the majority of runners (n=6) had slightly quicker GCTs and higher leg stiffness than were required for their optimal gait, some displayed the opposite. This highlights the importance of individual assessment for intervention provision.

The benefits of the BASES Early Career Grant
With the applied implications of the project in mind, a user-friendly, freely available software (https://doi.org/10.25401/cardiffmet.8323283.v1) and open-access publication (Moore *et al.*, 2019) were produced. The software requires minimal data input and visually displays a runner's optimal gait characteristic and will work for several gait characteristics (e.g. stride length, GCT and leg stiffness), allowing individual runner data to be calculated. To achieve these outcomes, a team comprising PhD, masters and undergraduate students was brought together allowing students to gain valuable skills in data collection, data analytics and mentoring. ■

Dr Izzy Moore

Izzy is a Lecturer in Sport and Exercise Medicine at Cardiff Metropolitan University. She was invited to submit this article as a winner of a BASES Early Career Grant.

Dr Kelly Ashford

Kelly is a research project manager at the University of British Columbia-Okanagan, specialising in sport and exercise psychology.

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Moore, I.S. *et al.* (2019). Humans optimize ground contact time and leg stiffness to minimize the metabolic cost of running. Frontiers in Sports and Active Living, 1(53).

Acknowledgements: We would like to thank our participants, Michael Long for his technical expertise and the research team: Charlotte Cross, Jack Hope, Holly Jones and Molly McCarthy-Ryan.

Land's End to John o' Groats Cycle Challenge: An overview of the support provided and a qualitative appraisal of its impact

Gavin Thomas, Dr Matthew Cook, Dr Ben Duncan, Joe Bevins and Dr Mark Corbett outline the interdisciplinary support provided to a 50-year-old male cyclist prior to cycling Land's End to John o' Groats.

Introduction

Cycling the entire length of the UK from Land's End to John o' Groats is a popular endurance challenge. This article documents the support provided to Mark Warren, a 50-year-old male cyclist, from 9 months (November 2018-July 2019) prior to the solo challenge (24th July). The target our athlete had set himself was to complete the 1,000+ mile cycle in 11 days. Our team comprised two physiologists (Gavin Thomas and Dr Ben Duncan), a nutritionist (Dr Matthew Cook), three technicians (Dr Mark Corbett, Joe Bevins and Matt Davies) and two research students (Meg Price and Elliot Maslen). We also provide a unique documentation of the athlete's (Mark) reflection of the scientific support implemented.

Needs analysis

Prior to the support, a needs analysis was undertaken to determine the demands of endurance cycling. This started with evidence gathering, drawing upon published literature to facilitate the creation of a specific action plan. Based upon the needs analysis, it was evident that maximal oxygen uptake ($\dot{V}O_2max$) and power produced at maximum is a prerequisite of endurance cycling success. However, because large distances (100 miles +) over different terrain and environments will be covered daily, the ability to maintain a high rate of energy expenditure for a long duration (at a high economy of effort) will be highly dependent on Mark's physiological thresholds. In addition, the extended duration of the challenge means comfort on the bike whilst cycling day after day would be key to success. The support included repeat assessment of body composition, lactate threshold (LT), $\dot{V}O_2max$, nutritional guidance and a bike fit.

Physiology

Body composition was assessed according to the International Society for the Advancement of Kinanthropometry protocols. Skinfolds were taken from the triceps, subscapular, biceps, iliac crest, supraspinale, abdominal, front thigh and medial calf by an accredited practitioner with a technical error of measurement of 5.6%. The sum of 8 sites was measured at 71 mm prior to the start of training. This equated to 8.3% body fat (Yuhasz, 1982). To determine $\dot{V}O_2max$, Mark performed a ramp test on a Lode Excalibur cycle ergometer. The intensity was increased by 1 Watt (W) every 3-s until volitional exhaustion. $\dot{V}O_2max$ was 52 $ml \cdot kg \cdot min^{-1}$, achieved at a power output (PO) of 346 Watts and 169 bpm. The LT test commenced at 100 W for 4-mins. After the initial stage, the required workload increased by 25 W every 4-mins. LT 1 was achieved at 175 W (80%HRmax) and LT 2 was achieved at 225 W (91%HRmax). Functional threshold power (FTP) is defined as the highest PO that a cyclist can maintain in a quasi-steady state for approximately 1-hour without fatiguing. Mark's FTP was originally tested during a 1-hr time trial (TT) in the lab. The average PO maintained was 187 W. However, this was extremely demanding mentally and time consuming, therefore due to Mark having a power meter, future assessments of FTP was self-administered on the road (as described by Allen and Coggan, 2010). This involved a maximal self-paced 20-min cycling TT whereby the average PO was scaled by 95%.

Mark's thoughts

"The most important aspects for me were establishing LT1 power and heart rate, as I knew that to complete the challenge I would need to be as efficient as possible. Approximately 70% of my training was around this endurance zone and on key long-distance training rides I maintained heart rate at around LT1 but allowing for increases on climbs and decreases on descents or fast sections of road. I used LT2 heart rate as a ceiling for my climbing efforts in order to avoid too much lactate accumulation and burning of glycogen. I familiarised myself with the power zones on my bike power meter that corresponded with LT1 and LT2. Follow up LT1 and LT2 tests showed that this approach was successful and I felt confident starting the challenge with a sound riding strategy that I knew would get me to the end. I chose not to ride with heart rate as I knew that environmental conditions, dehydration and fatigue during the challenge would result in higher than normal heart rate levels. Instead I used power, and 'feel' as a way of managing my efforts on each day."

Nutrition

We started by interviewing Mark to understand his current nutritional practices. This included what he did pre, during and post training and competitions. The majority of the nutritional advice given was through educating Mark on good nutritional practices to support performance. Example meal plans were given, demonstrating meal choices to give a high carbohydrate intake (i.e. ~7-10 $g \cdot kg^{-1} \cdot d^{-1}$) in the days before competition and a feeding strategy during the challenge was also discussed. As the support was over a 9-month period, Mark was also encouraged to practise the strategies within training to train the gut for tolerating high carbohydrate intakes. Reduced carbohydrate availability (i.e. fasted training) during short-term periods of training was also used to help promote adaptations to the endurance training being undertaken (Hawley & Morton, 2014).

Mark's thoughts

"There were key learning points for me around nutrition, mainly 'fasted' training sessions, pre-event carbohydrate loading and intake rate whilst riding. I used fasted training, or training 'low', on average once per week in the early stages then reduced this to a lower frequency as I entered a phase of interval training. I believe fasted sessions added to my gains around economy as the basis of fasted training is to stimulate muscle mitochondria growth. I entered several challenging 100-mile sportives in the run up to my challenge where I successfully practised pacing and nutrition. Ultimately, there was not a single day on my end-to-end challenge that I felt my body's fuel was depleting."

This applied feature aims to address issues and areas that are often common in the real world, but are seldom covered by the usual learning mediums (university courses, journals, books, etc.). Please contact the editor if you have any ideas for future issues: **editor@bases.org.uk**

Bike fit

The session started with an interview reviewing Mark's sporting background, cycling goals and medical history. A physical examination then assessed passive and active ranges of motion, symmetry and functional stability. Shoe fit, foot stability and cleat position with clip-in pedals were checked. A 3D motion capture system was then used to measure joint angles and various body parameters throughout the pedal cycle in realistic dynamic conditions with Mark on his own bike fitted to an ergometer.

Mark's hamstring flexibility and hip hinge range were somewhat restricted. This can inhibit pelvic tilt in the saddle, limit forward torso reach and impair good posture on the bike causing discomfort through increased spinal flexion and shoulder protraction. Some of this restriction was attributed to sciatic nerve tension so incorporating some neural flossing into a pre-ride routine was recommended. Shoe condition and cleat position were good. Some cycling specific footbeds were recommended to better match a moderate arch height and tendency for pronation.

Mark's saddle was slightly low, limiting knee extension through the bottom of the pedal stroke. The saddle was also too far forward, placing centre-of-mass forward, pitching weight onto the front of the bike through the hands and creating tension through posterior postural back and hip muscles. Moving the saddle back ~30 mm improved knee extension and centre-of-mass position, enabling a more balanced position with effective support from the dynamic pedalling action taking pressure off the hands and giving better weight distribution on the bike.

A smaller 10 mm reduction in handlebar stem length meant a net increase from saddle to handlebars of ~20 mm. This longer reach remained stable with the improved saddle position giving better weight support. A slight lowering of torso angle gave potential aerodynamic gains without sacrificing the overriding priority of comfort.

Mark's thoughts

"This proved revelatory on two levels; my seat fore-aft position and my pedalling technique. I had positioned my seat too far forward, which resulted in opposing forces from pedalling pushing me forward on the bike, this explained why I was regularly shuffling back on my seat whilst riding. I have some cartilage loss in my right hip resulting in a tightening of muscles controlling hip flexion. This causes my right knee to track out away from the bike as my right foot rises on the pedal stroke. I assumed this was making my technique poor and unbalanced. The bike fit analysis clearly showed my knee movement but was within acceptable limits and that I was not overtly unbalanced. This gave me the confidence to continue training in the knowledge that my technique was good enough to get the job done."

Table 1. Data from the challenge

Day	Distance (miles)	Duration (hrs:mins)	Calories (kcal)	Elevation Gain (feet)	Average power (Watts)
1	102	07:51	4,819	7,595	195
2	93	07:30	3,552	6,325	172
3	126	09:29	4,590	6,486	171
4	108	08:30	4,024	5,128	165
5*	37	02:50	1,600	1,724	164
6	94	07:33	4,138	8,740	188
7	97	06:56	3,738	4,934	175
8	105	07:41	3,708	4,961	172
9	121	09:00	4,530	6,699	172
10	93	06:25	2,876	4,281	163
11	101	07:11	4,225	5,771	187
	1,077	**80:56**	**41,800**	**62,644**	

*Torrential rain and storms created unsafe riding conditions to complete the planned distance of 100 miles.

Above: Mark Warren at John o' Groats

Conclusion

Communication, trust and team work during the 9-month preparation period between athlete and all practitioners was key for the interdisciplinary support to be effective. The monitoring of training, repeat testing and the completion of several 100-mile sportives provided feedback that informed future training decisions, ensuring Mark was optimally prepared going into the challenge. Mark achieved his target and successfully completed the Land's End to John o' Groats Cycle Challenge in 11 days (see Table 1) and in doing so raised £2,405 for the charity Event Mobility. ■

Gavin Thomas

Gavin is a Senior Lecturer in Sport and Exercise Science at the University of Worcester and is a BASES accredited sport and exercise scientist.

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Joe Bevins

Joe is a Senior Technical Engineer at the University of Worcester.

Dr Mark Corbett

Mark is a Lead Technician at the University of Worcester.

Mark Warren

Mark is a keen cyclist who loves the outdoors.

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Allen, H. & Coggan, A. (2010). Training and racing with a power meter. Boulder, CO: VeloPress.

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Acknowledgements: Matt Davies, Meg Price and Elliot Maslen for assisting with the support.

Future directions in processing kinematic data during live events

Drs Neil Cronin and Athanassios Bissas discuss advancements in producing fast data with immediate feedback in the field.

Introduction

The world of motion analysis is changing rapidly due to unprecedented advances in hardware and software technology. This has serious implications in the way we, as biomechanists, conduct our kinematic analysis.

> **The battle for sport biomechanists in the near future is to offer an integrated package combining fast and accurate data with kinesiological interpretation.**

Technological advancements are laboratory-based

Following decades of continuous advances in motion analysis techniques, we are entering the third decade of this millennium with yet more robust and intelligent methodologies for capturing and studying movement. The fourth generation of optoelectronic systems and digital 4K videography offer all the necessary tools to dissect movement more accurately and reliably than ever before.

However, whilst such advancements have transformed the way we conduct research in controlled environments, their applications to live settings remain problematic. This is either because of the impossibility to attach markers to the performer's body during competition (optoelectronic systems) and therefore, track movement, or the inability to provide fast data once images have been collected (videography). Therefore, the battle for sport biomechanists in the near future is to offer an integrated package combining fast and accurate data with kinesiological interpretation.

Future directions and issues

So, what type of innovations are required to produce fast data with immediate feedback, something possible under laboratory conditions but currently not feasible during official competitions?

Recent advances in technology give us some clues. Lately, markerless methods have begun to appear, and several companies already offer markerless motion analysis "off-the-shelf." One example comes from the use of depth-sensing cameras, which provide information about the distance between the camera and objects in the image. Perhaps the best known of these is the "Kinect," which is mainly used for interactive gaming. Although this approach does provide rapid feedback, the accuracy is unlikely to be sufficient for typical biomechanics scenarios, where sub-degree accuracy of joint kinematics may be desirable.

Another promising approach relies on the use of artificial intelligence. Specifically, deep neural networks have been shown to be capable of distinguishing different body parts in an image, and this information can be used to reconstruct a model of a moving person. Deep learning approaches usually rely on so-called "supervised learning," whereby a neural network is fed with images and corresponding labels that effectively tell the network which part of the image to focus on. When enough image-label pairs are given, the trained network can eventually "learn" to identify specific body parts. Although training successful deep learning models often requires a lot of computational expense, once the model is able to make good predictions, the computational load involved in analysing new data is quite low. With modern computers including high-end graphics processing units, it could be feasible to give performance feedback within seconds, at least for some variables. This in turn would make it possible to develop phone-based apps, so that biomechanists could simply combine this with some low-cost cameras.

However, it is important to emphasise that deep learning approaches are almost always trained to perform a quite narrow task, and their ability to generalise to new or even similar tasks is very limited. For example, if a model is trained using labelled data taken from an indoor athletics competition, it is likely that it will be able to correctly identify target body parts when shown new images taken from a similar setting. But, if the same trained algorithm is shown data from an outdoor competition (where lighting, clothing etc. may be quite different), the model will make much poorer predictions. An easy solution to this problem would be to include a larger, more diverse set of training images (in this case, data collected indoors and outdoors).

It is important to highlight that we do not currently know how accurate markerless methods are, for example in relation to marker-based "gold-standard" techniques. Nonetheless, deep learning is now a hugely popular field, and new approaches are emerging rapidly. For applications where cameras are available, it seems likely that methods employing artificial intelligence techniques will gain traction in this field.

A cautionary note

In order to use markerless methods like those described above, it is necessary to secure tens of camera vantage locations around a stadium and operate equipment in an experimental manner alongside thousands of spectators and hundreds of officials, stadium staff and TV crews. Our recent biomechanical projects for World Athletics (www.worldathletics.org/development/research) taught us that this is the most challenging component of such ventures and it will remain as such unless the use of wearable technology, which is still developing, is permitted in competition settings. ■

Dr Neil Cronin

Neil is an Associate Professor at the Faculty of Sport and Health Sciences, University of Jyväskylä, Finland, and a Visiting Research Fellow at the Department for Health, Bath University.

Dr Athanassios Bissas

Athanassios is the Academic Subject Leader for Applied Sport & Exercise Sciences in the School of Sport & Exercise at University of Gloucestershire.

17th BASES Heads of Department Forum

Agenda

Wednesday 18th March 2020 • TechnoCentre, Coventry University

A day of information, insights and networking for those with leadership roles within sport and exercise sciences academia

BASES
The British Association of Sport and Exercise Sciences

Prof Richard Tong FBASES

Richard Tong is the Chair of BASES and Assistant Principal, Higher Education at NPTC Group of Colleges. He has made a significant contribution to the development of learning and teaching in sport and exercise science, working for the Higher Education Academy, Quality Assurance Agency and the University of Wales.

Prof Gareth Stratton, Swansea University

Gareth is Deputy Pro-Vice Chancellor for Physical Activity, Sport, Health & Wellbeing and recent Head of the School of Sport and Exercise Sciences at Swansea University. Prior to this he held leadership roles in Physical Education and Sport and Exercise Sciences in LJMU. He has also chaired programme development groups for the National Institute for Health Care Excellence (NICE) and is an expert advisor to the UK Physical Activity Guidance group. He holds a chair in Paediatric Exercise Science and an adjunct chair in the University of Western Australia.

Prof Dave Richardson, Liverpool John Moores University

Dave is Director of the School of Sport and Exercise Sciences at LJMU. He is an established authority in organisational culture and is extensively published in areas aligned to strategic, operational, cultural, social and psychological practice; athlete development, welfare and transition in high performance environments and community health agencies.

Prof Richard Thelwell FBASES, University of Portsmouth

Richard is a Professor of Applied Sport Psychology and Head of School of Sport, Health and Exercise Science at the University of Portsmouth. He is a HCPC Registered Psychologist and a BASES accredited sport and exercise scientist.

Dr Steve Ingham FBASES, Supporting Champions

Steve is steeped in high performance and has been integral to the development of Britain into an Olympic superpower. He has supported over 1,000 athletes, including Dame Jessica Ennis-Hill, Sir Steve Redgrave and Sir Matthew Pinsent and Kelly Sotherton. Steve is the author of "How to Support a Champion – The art of applying science to the elite athlete" and he has established Supporting Champions with the ambition of bringing performance know-how to help people achieve their goals.

Melissa Wood, TEF Programme Manager, Swansea University

Melissa currently leads on university-wide transformational change in learning and teaching, and the student experience for Swansea University. She is the institutional lead for the Teaching Excellence and Student Outcomes Framework (TEF) and manages the effective development and implementation of university strategy, including the University Strategic Plan, Learning and Teaching, Digital, and Internationalisation Strategies.

10:00 Arrival with Refreshments

10:15 Welcome and Introduction
Prof Richard Tong FBASES &
Dr Lance Doggart FBASES

10:25 Sport and Exercise Science – HoD department roles, challenges and strategies for being successful
Prof Gareth Stratton
Prof Dave Richardson
TBC

11:10 Break

11:25 Break Out Sessions
– Workshops lead by Prof Gareth Stratton, Prof Dave Richardson and TBC

12:00 Feedback

12:30 Lunch

13:10 SEPAR Update
Prof Richard Thelwell FBASES

13:25 Developing Professionals of the Future
Dr Steve Ingham FBASES

13:50 Swansea University's Experience of the TEF: A TEF Gold Institution
Melissa Wood

14:50 Feedback
Emerging Issues for March 2021
Thank Yous
Prof Richard Tong FBASES &
Dr Lance Doggart FBASES

15:00 Close and Depart

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The physiology of the sub2-hour marathon "no one is limited"

Richard Taylor discusses Eliud Kipchoge's 26.2 miles in 1:59:40.

In a Vienna's Prater Park last year, the 34-year-old Eliud Kipchoge ran 26.2 miles in 1:59:40. Covering each of the 26.2 miles in an average of 4:34 minutes and no slower than 4:36 per mile. To put this into context, Kipchoge repeatedly ran 28:26 10,000m splits, that is only 8% slower than Kennenisa Bekele's 26:17 10,000m world record and only 7% slower than his best ever 10,000m (26:29). With the support of a 42 strong squad of pacemakers (which included Olympic and World Champions), running in groups of seven and rotating every 5,000m, Kipchoge made what some thought impossible look simply effortless. I wish I had made 4:30 minute miles look so easy over anything further than 5km. Whilst there has been a lot of discussion about the influence of the shoes, they are not going to move very quickly on their own, and still require an athlete in them with the physiology to get near to a 2 hr marathon.

> **"Whilst there has been a lot of discussion about the influence of the shoes, they are not going to move very quickly on their own, and still require an athlete in them with the physiology to get near to a 2 hr marathon."**

The right athlete for the job

Maximal oxygen uptake ($\dot{V}O_2max$) and running economy have been identified as key determinants of endurance running performance (Jones, 2006). Typically, we expect international standard distance runners to have $\dot{V}O_2max$ values of 70 to 85 $mL \cdot kg^{-1} \cdot min^{-1}$ and a good running economy, i.e. a low $\dot{V}O_2$ for a given running speed.

As early as 1991, Joyner (1991) predicted that the fastest men's marathon time possible was 1:57:58 (versus 2:05:42 in 2000). This was based on a subject with a $\dot{V}O_2max$ of 84 $mL \cdot kg^{-1} \cdot min^{-1}$, a lactate threshold velocity at 85% of their $\dot{V}O_2max$ and an energy running cost of 204 $mL \cdot kg^{-1} \cdot min^{-1}$. Joyner further suggested that marathon running velocity could be slightly above their lactate threshold (LT) velocity, potentially at 90% of their $\dot{V}O_2max$.

Table 1. Personal best performances of the top three men's marathon runners (worldathletics.org)

Distance	Kipchoge	Bekele	Legesse
1500m	03:33.2	03:32.4	03:44.1
3000m	07:27.7	07:25.8	07:51.1
5km	12:46	12:37	13:08
10km	26:49:00	26:37:00	27:34:00
Half M	59:25:00	12:00:00	59:50:00
Marathon	02:01:39	02:01:41	02:02:48

Whilst I would love to have access to Kipchoge's test data prior to the sub2 attempt, we can make some practical comparisons from the previous women's world record holder. Her world record pace of 18 km·h^{-1} is at 79.5% of her velocity at $\dot{V}O_2$max (23.5 km·h^{-1}). Interestingly, her LT velocity was 89% of her $\dot{V}O_2$max velocity, suggesting that given the right race conditions (course, pacing, fuelling strategy), similar to those set up in Vienna, the women's world record could have been faster. Moreover, Billat *et al.* (2001) suggest that top-class marathon runners require high-level personal bests at 1500m (<3 min 40 s), 3000m (<7 min 40 s) and 5000m (13 min 40 s), hypothesising that dedicating a large part of their training close to their 3000m-10,000m velocity is key to successful marathon performance. Given that Kipchoge demonstrates equally fast personal bests at the shorter distance events as Bekele and the longer distances as Legesse, the next two fastest marathon men of all time (see Table 1), he may have the ideal combination of speed and endurance to go sub2.

rank him in the top 100 best half marathon times ever (100th is 59:35). In fact, Kipchoge's best half marathon only ranks him 69th on the all-time list. Unfortunately, for our knight of the realm and everyone else, Kipchoge does not stop but promptly runs another 59-minute half marathon. It is this second half marathon where he pushes what we think is possible. If the two best half marathon times in the UK in 2019 where to race him in a relay (1:59:45), Kipchoge would still win by 5 seconds. I would happily bet my house on Kipchoge winning the sprint finish against the relay team.

The performance will not be recognised as an official world marathon record for several reasons, including how the pace makers were used, assistance from the pace car and it not being a recognised race. Despite this, we have witnessed the first sub2 marathon. It has been compared to Roger Bannister breaking the first 4-minute mile, something I am not old enough to have seen. Therefore, similar to after the first 4-minute mile, will we now see the first official sub2 marathon? Unlike a mile race, marathon races have much greater scope for conditions to work against the athlete. Despite this, given the right course and race set up, Kipchoge appears to possess the ideal physiology to take the world record below 2 hours. Remember, no human is limited. ■

> **Whilst slightly slower than the parkrun world record of 13:48, his 14:16 would certainly win most Saturday parkruns easily. The next time you do a 5km check your watch at 14:16 and see how far off you are.**

Physiology of the sub2 performance

Whilst most marathon runners will have a race strategy that will best suit them, they have to respond to their competitors. This typically results in the first few miles being completed faster than the average pace of the race; resulting in athletes having to start at a pace close to or above their $\dot{V}O_2$max, which increases energy contribution from anaerobic metabolism (Gonzalez-Alonso & Calbet, 2003; Mortensen *et al.*, 2005) early in the race. This has been proposed to increase the time taken to complete the marathon by 2-3% (Joyner 1991; Joyner & Coyle, 2008) as they have to manage the fatigue induced by a higher anaerobic contribution if the pace nears their anaerobic threshold and $\dot{V}O_2$max pace. In contrast the sub2 event allowed Kipchoge to focus on reaching his target pace of 4:34 miles as efficiently as possible without having to worry about any competitors. This consistent early pace would be a critical part of the record attempt, allowing Kipchoge to settle quickly into his target pace and run the majority of the race below or close to 85% of his $\dot{V}O_2$max pace. At this pace we would expect to see the majority of his energy generated oxidatively for both his slow- and fast-twitch muscle fibres.

As Kipchoge progresses onto the second half of the race his running economy will become more influential, helping to mitigate the rate at which $\dot{V}O_2$ rises during the run, minimising the O_2 deficit in the final stages (Sjodin & Svedenhag, 1985; Coyle, 1995). At present, the factors that delay or accelerate fatigue in prolonged endurance exercise at 80-90% of $\dot{V}O_2$max remain to be fully understood (Joyner & Coyle, 2008). Whilst Kipchoge's physiological test data would provide valuable insight into how the sub2 pace compared to his $\dot{V}O_2$max pace and go some way to explaining the physiological cost for his sub2 pace, his ability to maintain a 4:34 min·mile pace is still phenomenal.

Kipchoge's pace at what is potentially lower than 85% of his $\dot{V}O_2$max speed means that his repeated 5km pace looks comfortable (14:16) for him, even if not to me these days. To give context to this pace, it would rank him 62nd in the UK for the 2019 season. Whilst slightly slower than the parkrun world record of 13:48, his 14:16 would certainly win most Saturday parkruns easily. The next time you do a 5km check your watch at 14:16 and see how far off you are. As he passes 10 km in 28:26 and repeats this further 3.2 times, his time would rank him 5th in the UK for the 2019 season, less than 5 seconds slower than 4th at 28:21. By the time he passes half way in around 59:36, the only UK athlete to run faster in 2019 is Sir Mo (59:07). On a world stage, it would still not

Richard Taylor

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Intermittent fasting - the other side of the story

Ian Craig outlines the pros and downsides of intermittent fasting.

In recent years, the practice of intermittent fasting (IF) has become a popular dietary endeavour for improving multiple health indices, including insulin stability, weight management, inflammation, oxidative stress, blood lipid profiles, gut rest and detoxifying cellular waste. However, within a sporting context, a complete literature review reveals many equivocal results, so the purpose of this article is to contextualise and personalise the information, meaning that the potential relevance of IF becomes clearer when viewing an individual athlete.

The pros of IF in sport

Moro *et al.* (2016) studied 34 resistance-trained males, who were randomly assigned to an IF scenario, in which they consumed all food within an 8-hour window, compared a 12-hour window for the normal diet group. Despite no significant differences in caloric intake between the groups, after 8 weeks, the IF participants experienced a significant reduction in body lipids, blood glucose, insulin, and TNF-α and IL-1β (inflammatory cytokines), when compared to the normal diet group.

Around the same time, fasted training research by Impey *et al.* (2016) demonstrated that glycogen-depleted cyclists experienced bolstered 5' AMP-activated protein kinase (AMPK) activity (supporting increases in mitochondrial mass) and fat metabolism capabilities during exhaustive exercise, when compared to their glycogen-replete peers. The observation that raised AMPK levels initiate mitochondrial biogenesis was previously supported by a very balanced review by Barr and McGee (2008) - see Figure 1.

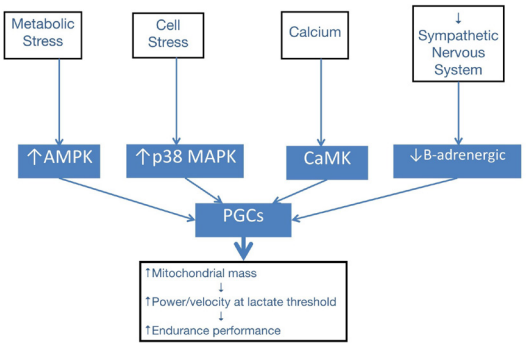

Figure 1. Biochemical initiators of mitochondrial biogenesis (Barr & McGee, 2008)

From this snapshot view, IF techniques would appear to be highly valuable to an athlete, and proponents of this strategy therefore focus on these "pros" of the approach. However, whenever there is such a strong and prevailing scientific health message, it is always worthwhile asking an incredibly simple, but important question, "What is the other side of the story?"

IF: the other side of the story

IF actually has a few downsides, and the first one is very obvious. By restricting fuel availability, the body is forced into a state of cellular stress. Impey *et al.* (2016) demonstrated a greatly diminished time to exhaustion in glycogen-depleted cyclists, plus they found that p70S6K activity (protein synthesis and cellular growth) was significantly suppressed 3 hours post-exercise, potentially inhibiting recovery.

Early research by immunologists, Nieman *et al.* (2005), found that placebo (as opposed to carbohydrate) ingestion during prolonged and intensive exercise was related to increased cortisol and adrenaline concentrations, plus more inflammatory cytokine activity. When exercising repeatedly in a food-restricted state, strong adrenal output is required for fuel metabolism (via gluconeogenesis), which tends to inhibit anabolic hormone activity.

Notably, Moro *et al.* (2016) measured a significant decrease in testosterone, insulin-like growth factor 1, and triiodothyronine during their 8-week study. The researchers did not measure an associated compromise in muscular strength, but the participants trained in the middle of their feeding period and were not fasted while training. If they had trained while fasted (the more common technique) and the study had lasted 8 months, not 8 weeks, we may have expected a larger compromise in anabolic function.

Research studies describe the study group as a whole, but we really need to be considering the "context" of an individual athlete's life. Of huge clinical significance in serious athletes is the risk of adrenal fatigue and overtraining. Such athletes may already experience compromised endocrine function, which an IF fasting regime can further exacerbate. Additionally, researchers have noted a wide variability of metabolic response to a low-carbohydrate diet in athletes, implying that within a context of n=1, some athletes will likely respond better to an IF regime than others.

Conclusions

From a health perspective, the practice of IF reduces the number of hours per day that an athlete needs to expend energy digesting and buffering blood sugar levels, but it also reduces the number of hours of fuel availability. Many short-term dietary changes reveal positive results, but as supported by practitioner observation, when extended to long-term intervention, multiple depletions can often result.

Additionally, a crucial point that is often missed in IF strategies is the word *intermittent*, which implies selective periodic fasting periods. This perhaps makes more physiological sense than the now popular pattern of missing breakfast every day; as Impey and colleagues imply, "fuel for the work required" is an important concept in sport. ■

Ian Craig

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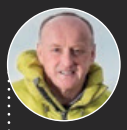

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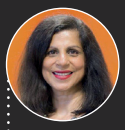

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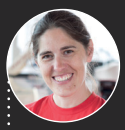

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Exercise-based prehabilitation workforce development for people living with cancer

Dr Andrew Scott, Prof Anna Campbell and Prof Sandy Jack discuss cancer and the role of appropriately trained exercise scientists in delivering prehabilitation.

> **One in two of us will have a cancer diagnosis during our lifetime (Cancer Research UK, 2015).**

Introduction to cancer and its treatment: outlining the problem

Cancer and its treatment are one of these life events that are projected to directly affect one in two of us in our lifetime. Whilst treatments for cancer are improving, the debilitating side effects of treatments such as chemotherapy, radiotherapy and surgery are significant. Whilst people who are currently fit and active may have sufficient cardiorespiratory and musculoskeletal reserve to resolutely deal with such treatments, people with lower physical and psychological fitness are less able to cope with the demands of treatment, which can lead to receiving incomplete chemotherapy doses and being ineligible for curative surgery. Those who are already fit and active on diagnosis may have their usual physical activity regime interrupted by three weekly chemotherapy cycles or daily radiotherapy treatments 5 days per week for 3 to 9 weeks.

Personalised, planned, structured and purposeful physical activity for people living with cancer

There is convincing evidence that increases in cardiorespiratory fitness pre-surgery play a crucial role in improving clinical outcomes. In addition, staying or becoming active during cancer treatment can help patients take control of their lives, reduce cancer-related side effects and enable them to live independently. During recent years there has been a proliferation of evidence to suggest that personalised exercise prescription and adherence to the prescription can support people in overcoming some of the negative side effects of treatment, such as sarcopenia, osteopenia, cardiac dysfunction, cardiometabolic disease, impaired aerobic fitness, decreased physical function, fatigue, decreased quality of life and social isolation and improve prognosis post treatment, such as reduced medical care requirements and length of stay in hospital (Cormie *et al.*, 2017). This can be achieved through appropriate assessment of health/fitness needs and the appropriate prescription of cardiovascular, resistance, balance and flexibility training modes before, during and following treatment.

Prehabilitation is the name of this service, which includes the three pillars of nutrition, psychological support/behaviour change and exercise to prepare the person for the difficult process they are about to pass through. Cancer subsites that are currently most likely to require prehabilitation are those requiring neo-adjuvant chemo-radiotherapy and major abdominal surgery, such as lung, upper and lower gastrointestinal, prostate and hepatobiliary cancers. Such treatment lowers cardiorespiratory fitness and recovery from the insult of surgery requires an elevated oxygen consumption. Pre-operative cardiopulmonary exercise testing (CPET) is available in many NHS Trusts in the UK as part of the pre-operative assessment process with patients who are considered high risk being assessed via CPET to use their gas exchange threshold to assess their perioperative risk. This is still not standard care in every NHS Trust though.

The new guidance *Prehabilitation for People with Cancer* published by the Royal College of Anaesthetists, Macmillan Cancer Support and the National Institute for Health Research (NIHR) Cancer and Nutrition Collaboration states that every person with cancer should receive a personalised prehabilitation care plan addressing nutritional, psychological and physical fitness needs (Macmillan, 2019). This requires a number of professional bodies across health, social care and leisure sectors working and collaborating with people affected by cancer to help co-design and implement the most effective and sustainable programmes based on each individual's needs and preferences.

The type of cancer, the stage, the treatments and the fitness/physical activity status of a person being treated for cancer will decide the level of support that such a person would require in terms of the type of health professionals involved, the level of expertise of the exercise professional and location of their exercise training. Various levels of support are available in prehabilitation with lower risk, more physically fit patients receiving universal (less specialist) guidance and support and people with greater comorbidities, physical limitations and high pre-operative risk stratification receiving more targeted or specialist support through more intensive supervision and exercise prescription from trained personnel.

In the guidance, prehabilitation interventions are categorised into 3 categories:

- **Universal:** Applicable to anyone with cancer.
- **Targeted:** Applicable to people with cancer with acute chronic or latent adverse effects of disease or treatments and other long-term conditions.
- **Specialist:** Applicable to those people with cancer who have complex acute/chronic needs, severe impairment and/or disability and for those with low functioning levels, unstable or stable cardiac respiratory issues, low confidence and/or very sedentary.

How can sport and exercise scientists play a role?

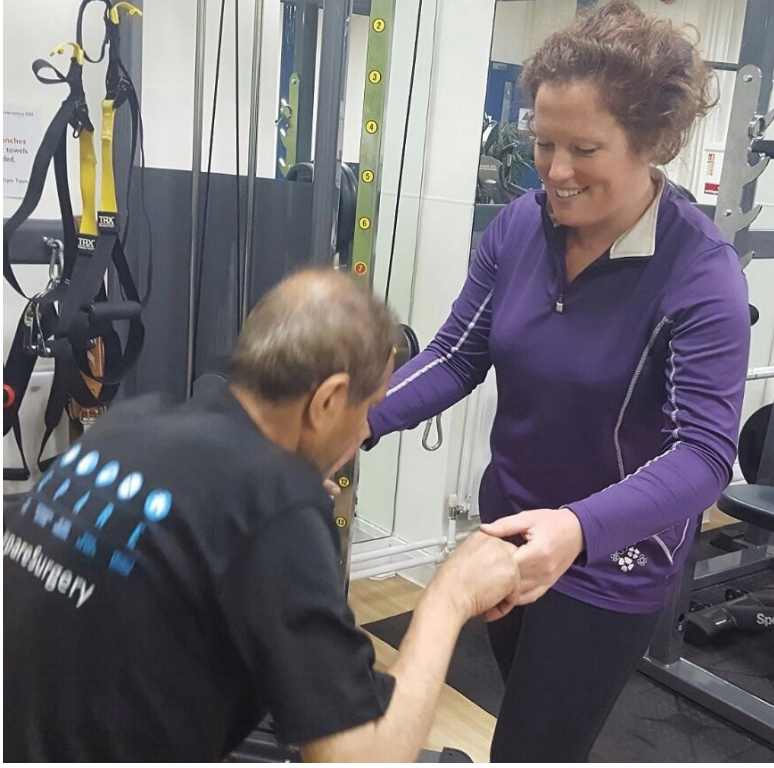
Although it is important that these services are developed with a multidisciplinary team that includes physiotherapists and other healthcare professionals, the Macmillan Prehabilitation guidance highlights that "currently there is no one professional who predominantly could or does provide advice and deliver the physical activity and exercise interventions." This is an important opportunity for sport and exercise science graduates to apply knowledge, skills and behaviours that they should have developed during their degree that can be applied in health care to support this large and diverse patient group. The role includes assessing physical status and prescribing personalised exercise interventions as an adjunct to patients' medical care to enhance their psychosocial, metabolic, musculoskeletal and cardiorespiratory fitness with an awareness of how each patient's personal circumstances, cancer subtype, stage, treatment and progress along the cancer care continuum will affect their engagement in prehabilitation. Equally, it is important to work in a multidisciplinary team of oncology care teams, physiotherapists, psychologists and dieticians to provide optimal care along with a network of physical activity options in hospital, at home and in organised fitness/physical activity that are guided by professionals trained in cancer treatment and exercise.

Professional regulation

Registration with the Professional Standards Authority (PSA) is an alternative, voluntary system that enables employers to specify a desired characteristic required of the workforce. The PSA has an established and tested method for making a risk-based assessment to regulate professions requiring registered status. It is planned that this discussion will be progressed.

Therefore, there is a pressing need to ensure that the NHS is able to recognise the skills of qualified clinical exercise scientists with training in exercise screening and assessments and monitoring and evaluation of interventions to support the exercise component of the three intervention categories. Vocational training in cancer treatment and exercise are available in the UK from CanRehab and clinical CPET training is provided by the Perioperative Exercise Testing and Training Society (POETTS).

These courses are being included in postgraduate degrees alongside clinical experience in exercise testing and training for people with cancer and more courses should engage with this to improve the employability for their graduates. In addition, Cancer Exercise Specialists with a skill set in providing safe effective individualised exercise programmes to change physical activity behaviours and improve cardiorespiratory fitness should be part of the workforce; particularly with those in the universal and targeted categories.



Above: Preparing a patient for surgery who was previously deemed unfit for surgery
Courtesy Hayley Osborn

> **It is clear from the guidance that sport and exercise scientists are being welcomed into this profession, but training is key.**

A call to action

1. Work with relevant registered and unregistered professional groups to define a competence and training framework for professionals in prehabilitation.
2. Work with the Professional Standards Authority (PSA), the Chartered Institute for the Management of Sport and Physical Activity (CIMPSA) and the British Association of Sport and Exercise Sciences (BASES) to define an approach to achieving accreditation and/or regulation for exercise professionals in prehabilitation.

Summary

It is clear from the guidance that sport and exercise scientists are being welcomed into this profession, but training is key. Exercise for long-term conditions needs to be included within BSc degrees, students need to train on a recognised postgraduate degree and gain experience in clinical exercise, specifically in exercise and cancer treatment. Exercise and Sport Science Australia recently explained the role of Accredited Exercise Physiologists (AEP) in supporting people undergoing cancer treatment (Turner *et al.*, 2019), who are recognised as healthcare professionals by Medicare, the Australian Healthcare Service. The UK must follow this path through accredited specialist training curriculum- and experience-wise, regulated by an appropriate independent body and with appropriate continuing professional development. Established organisations, such as Macmillan, the Academy for Healthcare Science, Exercise and Sport Science Australia, the American College of Sports Medicine, can support BASES to develop future Clinical Exercise Physiologists. The role is there, we are just looking for people who are ready to fill these roles. ■

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Sandy is Professor of Prehabilitation Medicine in the Anaesthesia and Critical Care Research Unit at University Hospital Southampton NHS Foundation Trust, Southampton.

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How to work with a coach who doesn't want to engage?

Dr Robert McCunn is the sport and performance columnist for The Sport and Exercise Scientist.

For the avoidance of any doubt I will start this column by saying that the topic I'm about to discuss is not a reflection of my own current working environment. I consider myself very lucky to work with the coaches and backroom staff that I do. In my opinion they are excellent; as are many sport coaches who are receptive to, and appreciative of, our field. However, it is not an uncommon scenario (unfortunately) whereby we, as sport scientists, can find ourselves paired with a coach or colleagues who may not be too fussed about interacting with us and in some cases may even be quite hostile towards the idea. This resistance can stem from a variety of sources including, but not limited to, the individual(s) in question feeling threatened by an outsider encroaching on their jurisdiction, not having been exposed to our discipline as an athlete themselves or indeed simply not wanting to work closely with someone they don't know or trust.

It is not an uncommon scenario (unfortunately) whereby we as sport scientists can find ourselves paired with a coach or colleagues who may not be too fussed about interacting with us and in some cases may even be quite hostile towards the idea.

In *Football Hackers: The Science and Art of a Data Revolution* by Christoph Biermann, the rise of "data" and its use within football is explored. For a book seemingly geared towards advocating for objectivity it is very honest about how there will always be enough uncertainty in sport for us to also need to consider subjective assessments and personal experience. When describing what a sport scientist does with parties not familiar with our industry, I often say that it broadly revolves around using objective data to help inform decision-making relating to all sorts of areas potentially including training content, rehabilitation from injury and talent identification. Bearing that definition in mind, it is obviously a challenge to do so if the ultimate decision-maker (i.e. the head coach) doesn't want to engage.

I won't pretend I can provide a failsafe way to address this scenario; rather I will simply offer some thoughts based on my own experiences (admittedly from team sports) to date. A good starting point is trying to determine what the coach's "game model" (the tactical principles associated with the preferred style of play) and/or "training philosophy" (the general principles that underpin the design of the training programme) is. Ideally this will have been explained to everyone but this doesn't always happen! How do they want the team to train and ultimately play? From this you can begin to infer what qualities they might consider valuable in a player/athlete and whether those qualities are something you can quantify in some way. Similarly, if you can identify their training philosophy then you can think about what kind of insights from you might align with that. For example, the type of information you attempt to share with the coach(es) would likely differ if they were focused more on availability and freshness of the players compared with if they were concerned with developing the toughest and hardest working team in the competition.

Another point I have come to appreciate is that there is often a difference between what you as a sport scientist need to know to do your job well and how much of that is useful to the coach. Keeping your feedback brief and simplified is probably preferable most of the time and it's ok to hold in reserve more detailed insights (or the workings that led to your conclusions). It can be tempting to want to show all the hard work behind your thoughts and recommendations but they are often not required by the coach(es). Even if one adheres to this advice, a headstrong coach may well still choose not to use you to the fullest but at least it won't be for a lack of alignment with their philosophy.

An even harder scenario arises if there is no discernible game model or training philosophy for you to work back from. How then should you decide what data to collect, interpret and attempt to influence decision-making with? Equally difficult is being tasked with a generic goal of helping athletes get stronger, more powerful, faster, fitter, more resilient to injury, leaner and tougher, etc…concurrently and in a short space of time. In this instance when there is either no direction given, or conversely the objectives given are too broad and vague to be helpful, I would say you have little choice but to fall back on the basics. Simply try to make any programming and delivery you do safe and simple. Importantly, keep a well organised database of whatever monitoring or testing you decide to do so that if and when you are eventually asked a question or for your input on an issue, you have an easy to access and navigate repository of evidence.

It's not my intention to come across as cynical or negative towards coaches in general. However, to hide away from the fact that we often do have to work in environments and with people who don't understand or respect the contribution we can potentially make would be disingenuous. As the prevalence and acceptance of sport science grows across most sports, today's applied practitioners have an important role to play regarding how the current players and athletes perceive our work. These will be the individuals who will be the head coaches and powerful decision-makers of the future. The more of a positive relationship and impact we have on them now (hopefully), the easier it'll be for the applied practitioners of tomorrow to get the buy-in required to operate effectively. ■

Dr Robert McCunn

Robert is a sport scientist at Brisbane Broncos Rugby League Football Club Ltd. and a BASES accredited sport and exercise scientist.

Reference:

Biermann, C. (2019). Football Hackers: The Science and Art of a Data Revolution. London: Blink Publishing.

Final Word with Dr Ailsa Niven FBASES

Above: Ailsa with her children

One journal article or book that I think all sport and exercise scientists should read

Read anything outside our field for pleasure or study as I think it helps us maintain perspective on our "world." Recently, I read *This is Going to Hurt: Secret Diaries of a Junior Doctor* by Adam Kay. Wow - that gives perspective!

One moment that changed the course of my career

In the last year of my undergraduate degree in Psychology at Edinburgh University I applied for an Economic and Social Research Council PhD studentship. I was unsuccessful so took a year "out" to au pair in a ski-resort, then work in a call centre, and contemplate my future. I don't remember actually applying but I vividly remember the moment I received a letter offering me a studentship to do an MSc Sport and Exercise Science (Psychology) at Liverpool John Moores University. Such a studentship is unheard of now and I was massively fortunate to have this financial support that opened up the world of sport and exercise science to me, it set me on my career path. That was a definite *Sliding Doors* moment - I'm not sure what I would be doing now without that funding!

One thing I do now that I didn't in my early career

I'm still working on this, but I'm trying to "do less, better" so that I don't feel so thinly spread, I am giving full attention to the most important aspects of my work and I am looking after myself. So, I'm getting better at saying, "No," which helps with this (or "I would love to…but right now I'm afraid I can't.")

One challenge that I think sport and exercise science faces

I think exercise psychology (or physical activity psychology) has yet to fully find and establish its place as a profession. Sport psychology has succeeded in creating a firm basis, clear professional pathway and unique selling point. Our work in physical activity psychology links with health psychology, medicine and public health, and that's a strength of the discipline (especially within research). However, this merging of disciplines makes it more difficult for physical activity psychology to establish its unique identity and a professional applied pathway.

What makes me proud

My daughters regularly make my heart swell with pride (who knew that was an actual thing?), and in a professional context, seeing our students develop and establish themselves makes me very proud.

One thing that I like to do on days off

I work part-time, so juggling family life takes up a fair bit of my days off. "My time" is going for a run. My husband and I have just been allocated places in the London Marathon (his first, my second) running for Mencap, so by the time this is published we will (hopefully) be well into our training (and still talking to each other).

One bit of advice that really influenced me

On being appointed to my current post and prior to starting, in our first phone call, my new line manager advised me to remember that family is a priority (my girls were aged 1 and 2 at the time). I try to remember that, and also the generosity and empathy of being a line manager who has a holistic perspective.

One thing I think the Government should implement immediately

As an academic, I'm going to focus on education. In return for free undergraduate university education, we would require students to take a year out and work in paid employment. I think this would help students more fully appreciate their opportunity to study, be certain in their degree choice, increase their application and motivation towards their studies, and avoid saddling them with debt.

One quote that I really like

"No one can make you feel inferior without your consent" - Eleanor Roosevelt

One inspiration

Much of my teaching is on the psychological determinants of physical activity, and I regularly remember and cite my late granny who at the age of 90 joined a private gym so that she could swim - she was inspiring.

One thing that really irritates me at work

The amount of time and effort spent on the research grant application and award process. It's a game we all have to play (with relatively low odds and often very limited feedback), but I often wonder how the time used to craft 80+ page applications could be better used actually doing research. I placate my irritation by focusing on the opportunities that applying for funding brings to work with others, and "recycle" unsuccessful applications and ideas.

One person I would like to have dinner with

I've got a few things I'd like to say to Boris Johnson, Prince Andrew and Donald Trump - but I'm not sure I could manage a whole dinner with them (or to be honest even a starter). Writing this has been a reflective process so I'd like to come full circle in my sport and exercise science career and have dinner with the Liverpool John Moores MSc Sport and Exercise Science graduates of 1996 - that would be a lot of fun (and possibly very messy)! ■

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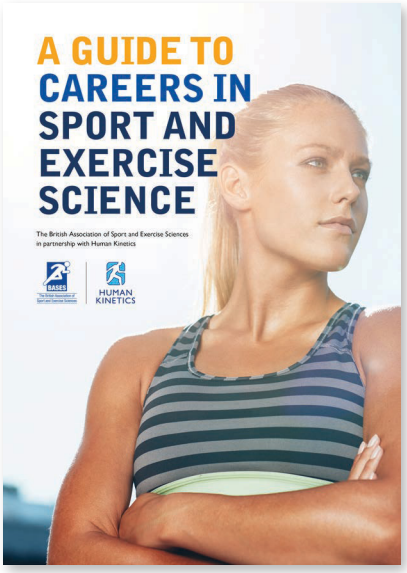

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