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The BASES Expert Statement on Interventions for Improving Performance in the Heat

Dr Jo Corbett, Dr Oliver Gibson,
Dr Neil Maxwell,
Dr Caroline Sunderland and
Prof Neil Walsh



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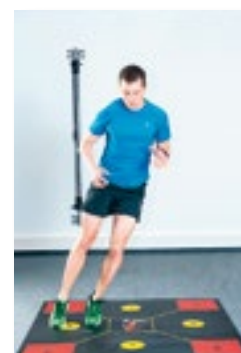
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- 27 Sep. UK Health Show, Olympia London
- 27-28 Sep. Fistic '17 "From start to finish", London
- 30 Sep. BASES Undergraduate Dissertation of the Year Award submission deadline
- 3 Oct. BASES SE workshop: Professional Ethics for Sport & Exercise Scientists, Brunel University London
- 3 Oct. BASES workshop: Safeguarding Welfare in Sport and Exercise Sciences, Brunel University London
- 10 Oct. Priorities for integrity and duty of care in sport - progress, policy options and the UK's global contribution, Central London
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The BASES Expert Statement on Interventions for Improving Performance in the Heat

Produced on behalf of the British Association of Sport and Exercise Sciences by Dr Jo Corbett, Dr Oliver Gibson, Dr Neil Maxwell, Dr Caroline Sunderland and Prof Neil Walsh.

Introduction

This expert statement presents practical, evidence-based strategies, for able-bodied individuals performing continuous or intermittent exercise ($> \sim 30$ minutes) in hot environments, defined as environments where exercise is negatively impacted by high thermal-stress.

Background and evidence

Many individuals must exercise in the heat and numerous sporting events take place in hot environments, e.g. the 2020 Olympic Games (Tokyo) and the 2022 World Cup (Qatar). The detrimental influence of heat on prolonged exercise is well established, although the effect is a continuum and depends on the balance between heat-gain and heat-loss; in some circumstances (e.g. high work-rates, humidity, thermal radiation, low airflow) performance is impaired within modest ambient temperatures ($\geq \sim 15^\circ\text{C}$).

Effective interventions can be administered in the days before (chronic), or on the day of and during (acute) heat exposure and will achieve one, or more, of the following: 1) increased or maintained heat dissipation; 2) reduced initial body-heat content; and 3) altered thermal perception.

Chronic interventions

Heat acclimation/acclimatisation

Acclimation (laboratory) or acclimatisation (natural environment) to heat (HA) reduces initial deep-body temperature and increases heat dissipation rates. This reduces the thermal-strain for a given external work-rate during exercise in a thermally-stressful environment. HA is a powerful tool for mitigating the effects of heat, although efficacy is reduced in environments limiting sweat evaporation, such as the microclimates within some protective clothing. Most studies have examined 'slow' adaptation (10–12 days exposure) of men, of modest fitness, in heat-stressed occupations and are less relevant to elite athletes, who are often partly acclimatised and have limited time to devote to HA.

HA is achieved by repeatedly elevating deep-body and skin temperature to a high level that elicits pronounced sweating. This is often achieved through exercise (active approach), either in a hot and/or humid environment or in clothing restricting heat loss, although very humid environments can lead to hidromeiosis (a reduction in sweating caused by blocking of the sweat glands). Passive approaches to HA, e.g. hot-baths ($\leq 40^\circ\text{C}$) of 15 to 40 minutes following training, can be effective (Zurawlew *et al.*, 2016), but as yet unconfirmed as equal to the traditional active HA programmes. The duration and frequency of heat exposures that maximises HA is unknown, although 60–90 minute daily exposures are common when using the active approach. Longer (~ 10 daily exposures) rather than shorter (~ 5 daily exposures) programmes are more effective. Nevertheless, shorter programmes result in some significant adaptations and are time efficient (Neal *et al.*, 2016). However, adaptation may be slower in females, who may require longer to achieve the same benefits (Mee *et al.*, 2015).

Maintaining thermal-strain (isothermal-strain) as the individual adapts, through progressively increasing work-rate or environmental stress, should be superior to exercising at a fixed work-rate and environmental stress, where the stimulus for HA diminishes as the individual adapts, although empirical support is lacking (Gibson *et al.*, 2015). Isothermal-strain typically uses higher initial work-rates than fixed work-rate protocols. In thermally-stressful environments this facilitates rapid elevation of

deep-body temperature, but thereafter requires little exercise for maintenance, potentially reducing total work; this may be preferable for athletes approaching competition. With all HA approaches deep-body temperature (rectal/oesophageal) should be monitored for efficacy and safety and individuals should be monitored for signs and symptoms of heat-illness. A target deep-body temperature of $\sim 38.5^\circ\text{C}$ is common (Gibson *et al.*, 2015); higher temperatures are unnecessary and increase heat-illness risk.

There is little evidence supporting dehydration as a way of enhancing HA, or that HA improves performance in cool environments (Neal *et al.*, 2016). It appears that HA is retained for at least 7 days (Neal *et al.*, 2016) and any benefits that are lost within a month of HA are re-acquired with 2–4 further exposures (Weller *et al.*, 2007).

Acute interventions

Hydration

Hypohydration impairs heat-loss, exacerbating negative effects of heat on performance. Therefore, individuals exercising in thermally-stressful environments should aim to commence exercise in a euhydrated state and prevent excessive dehydration ($> 2\%$ body weight loss from water deficit). However, excessive drinking can cause hyponatremia, which is life-threatening and individuals should drink to thirst unless they have a prescribed fluid-strategy.

Pre- and per-cooling

Pre- or per- (during) exercise cooling techniques include: 1) external cooling, e.g. cool water immersion, cooling garments; 2) internal cooling, e.g. ingesting cold-liquids or ice-slurry; and 3) mixed-methods (multiple external and/or internal).

Pre-cooling strategies aim to reduce deep-body temperature by ~ 0.5 – 1.0°C , enabling greater heat-storage before hyperthermia develops. So long as a notable heat-sink is generated pre-cooling can be effective (Tyler *et al.*, 2015). External cooling requires application of a cold medium to the skin sufficient to disrupt thermal equilibrium. Water immersion is often used, with temperatures of 12 – 18°C , durations of 20–30 minutes, and deep-body temperature monitoring for safety. However, decreased muscle and skin temperature causes cutaneous vasoconstriction, diverts blood from active tissues and slows nerve conduction and muscle contraction, which can cause initial feelings of 'sluggishness'. Vasoconstriction also causes diuresis, which is increased by hydrostatic pressure if water immersion is used. By ingesting cold-liquids or ice-slurry, internal cooling may reduce this 'sluggishness' and contribute to hydration. Typically, $7.5 \text{ g}\cdot\text{kg}^{-1}$ body mass of cold-liquids (carbohydrate/electrolytes) or ice-slurry are ingested in the 20–30 minutes before exercise. For a given volume, ice-slurry creates a larger heat-sink than cold-liquids because of the latent heat of fusion, but ingesting ice-slurry can be uncomfortable, reducing ad libitum drinking. Theoretically, mixed-methods should generate the greatest heat-sink, although this has received little attention. Few studies have employed a realistic 'warm-up'; practitioners should consider the purpose and integration of warm-up within any pre-cooling intervention.

Although there is some evidence that per-cooling might inhibit normal thermoregulatory responses, this has not been demonstrated in a performance scenario. Indeed, per-cooling can be effective for enhancing exercise performance in the heat (Tyler *et al.*, 2015). In some activities wearing cooling garments is

Table 1. Strategies for improving performance in the heat

Intervention	Strategy	Strengths	Limitations
Chronic			
Heat acclimation/acclimatisation	- Active approach: short- (~5 × 60-90 minute daily exposures) or longer-term (~10 × 60-90 minute daily exposures) programmes. - Passive approach: 15-40 minutes hot-baths following training. 38.5°C target deep-body temperature.	- Reduces initial body-heat content. - Increases thermoregulatory capability. - Significant adaptations with short-term programme. - Most benefits retained for ≥ 7 days. - Re-induction possibly quicker than acquisition.	- Time-consuming/expensive. - Short-term less effective than longer-term. - Active may compromise training. - Effectiveness reduced when evaporation compromised. - Adaptations decay over time. - Deep-body temperature monitoring required. - Females may require more sessions.
Acute			
Hydration	Ensure euhydration before exercise and prevent excessive dehydration thereafter.	- Helps maintain thermoregulatory capability. - Cost-effective.	- Practically/logistically difficult in some situations. - Palatability/tolerance may affect ingestion rate.
Pre-/per-cooling	- External, e.g. cool-water immersion, cooling garments. - Internal, e.g. cool-liquid or ice-slurry ingestion. - Mixed-methods.	- Reduces initial body-heat content and/or creates heat sink. - Effective when evaporation compromised. - Cost-effective.	- Some approaches logistically difficult. - Feelings of sluggishness (external-cooling). - Deep-body temperature monitoring required (pre-cooling). - Cooling garment efficacy influenced by environment.
Perceptual manipulations	- L-menthol application. - Local cooling.	- Reduced perception of hotness. - Cost-effective.	- Little/no effect on thermal state. - Potentially dangerous; may enable high deep-body temperatures.



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References:

Gibson, O.R. et al. (2015). Isothermic and fixed intensity heat acclimation methods induce similar heat adaptation following short and long-term timescales. *Journal of Thermal Biology*, 49, 55-65.

Neal, R.A. et al. (2016). Effect of permissive dehydration on induction and decay of heat acclimation, and temperate exercise performance. *Frontiers in Physiology*, 7, 564.

Mee, J.A. et al. (2015). A comparison of males and females' temporal patterning to short- and long-term heat acclimation. *Scandinavian Journal of Medicine and Science in Sports*, Suppl 1, 250-258

Tyler, C.J., Sunderland, C. & Cheung, S.S. (2015). The effect of cooling prior to and during exercise on exercise performance and capacity in the heat: a meta-analysis. *British Journal of Sports Medicine*, 49, 7-13.

Weller, A. et al. (2007). Quantification of the decay and re-induction of heat acclimation in dry-heat following 12 and 26 days without exposure to heat stress. *European Journal of Applied Physiology*, 102, 57-66.

Zurawlew, M.J. et al. (2016). Post-exercise hot water immersion induces heat acclimation and improves endurance exercise performance in the heat. *Scandinavian Journal of Medicine and Science in Sports*, 26, 745-754.

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possible during exercise. Phase change garments such as 'ice vests' may inhibit some evaporative heat-loss because skin contact is required for conductive heat-transfer and may be more appropriate when evaporative heat-loss is restricted, e.g. protective clothing. The effectiveness of ventilated vests is affected by the air ventilating the vest and is reduced with hotter and more humid air.

Perceptual manipulations

Some interventions induce sensations of coolness with minimal influence on thermal state. L-menthol, applied cutaneously, or swilled/ingested in drinks in low concentrations, stimulates cold receptors, although the evidence that this enhances performance is equivocal. Applying a cool medium to areas with high allesthesial thermo-sensitivity, e.g. ice-packs on the neck, can enhance performance with negligible cooling (Tyler *et al.*, 2015). However, we advise caution with perceptual manipulations, which may result in dangerously high body temperatures whilst masking signs and symptoms of heat-illness.

Conclusion and recommendations

Performance in the heat can be improved by increasing or maintaining heat dissipation, reducing initial body-heat content or altering thermal perception. The optimal intervention(s) for an individual must be determined on a case-by-case basis taking into account the intervention mechanism, efficacy, practical and logistical constraints and safety issues (see Table 1). Any intervention should be practised before competition, under supervision of an experienced practitioner and with appropriate monitoring. ■



Above: The 'Can you Compete Under Pressure?' homepage

The promise of online interventions: from sports to the dining table

Dr Tracey Devonport FBASES details the application of the empirical and practical lessons learned from the BBC Lab UK project, in developing research in an alternative context.

To mark the 2012 Olympics hosted in London, in collaboration with the British Broadcasting Corporation (BBC) Lab UK, an online research project was launched and presented by four-time Olympic champion Michael Johnson. The research, led by Prof Andy Lane FBASES, was developed to show people psychological skills, used by top athletes, which sport psychologists teach. BBC Lab UK had previously developed a number of projects, and all had large sample sizes (e.g. the Big Personality Test). Data are collected online, which has limitations, but opens up lots of possibilities, as so much data can be captured. In fact, every keyboard stroke, mouse movement, and time spent completing each part can be evaluated.

Our BBC project was developed to address the question, 'Can You Compete Under Pressure?' (www.bbc.co.uk/labuk/experiments/can-you-compete-under-pressure). The project evaluated a participant's performance on a concentration grid task, which was done in competition against a computer generated opponent, with this opponent matched for the participant's ability as evidenced during practice. In excess of 40,000 volunteer participants followed one of three intervention types (imagery, self-talk, and if-then planning), with each intervention directed to one of four different foci (outcome goal, process goal, instruction, or arousal-control). This produced a total of 12 different intervention possibilities, with participants following one of these interventions just before completing the concentration task (Lane *et al.*, 2016). Results indicated that the online interventions were effective in teaching psychological skills, and that for the performance task used, brief interventions that focused on increasing motivation, arousal, effort invested and pleasant emotions proved to be the most effective. We published the article in *Frontiers*, an open-access journal, which was intentional so that people could find the work. To date, the article has had over 20,000 views.

Since undertaking this research, we have sought to apply the lessons learned in developing and delivering the online intervention to projects in different contexts. It is fair to say that during the formative years of sport and exercise psychology, researchers and practitioners borrowed theory and practice from the more established domains of psychology. In recent

"In recent years, having had time to develop and mature as a discipline, sport and exercise psychology has shown itself capable of giving back, whereby the theories and practices developed and refined in a sport and exercise context are utilised in other domains."

years, having had time to develop and mature as a discipline, sport and exercise psychology has shown itself capable of giving back, whereby the theories and practices developed and refined in a sport and exercise context are utilised in other domains. I will illustrate the ways in which the 'Can You Compete Under Pressure?' project might offer one such example. This article details how we are looking to apply the empirical and practical lessons learned from the BBC Lab UK project, in developing research in an alternative context. Specifically, we are extending our examination of the associations between emotions and performance behaviours, to the study of emotional eating, which is described as eating to meet an emotional need, rather than to satisfy physical hunger.

The 'Can You Compete Under Pressure?' project was developed with the Olympics in mind, to capture the general public's interest in the psychological skills of elite athletes. We considered during the study how the skills we learned could be applied to different contexts. One area of importance in sport, exercise and daily life are our emotions and attitudes around diet. For all sport and exercise participants, but perhaps especially those in weight classified sports, better understanding of associations between emotions and eating holds value. Evidence suggests that we may all consume food in response to emotions to some extent (Devonport *et al.*, 2017), and whilst for most this does not become troublesome, for others it can (Nicholls *et al.*, 2015). Whilst our research in this area is in the early stages, we are working towards online intervention development and delivery.



Above: The BBC Lab UK homepage

In completing the BBC project, we learned the value of fully conceptualising the aims of the intervention and to start developing the content before software programmers are engaged. It is important to ask questions such as 'What do you want your intervention website to be able to do?' and 'What do you want end users to get out of it?' We didn't just sit back and contemplate - we tested each part of the method. We asked people 'What did you think of the study?' and sought answers of whether it was engaging. It is worth remembering that we have had a wealth of experience undertaking face-to-face data collection, and reflections on such experience point to thinking that if participants find involvement in the study to be tedious, then you don't get the best data. We wanted the BBC study to be engaging for people.

In terms of the specifics of the research question and aims, we considered how our previous research; particularly Lane and Terry's (2000) model of mood, guided the BBC study so that we could offer meaningful feedback. It's worth remembering the Lane and Terry model was first presented at the BASES Conference, York 1997 and was awarded the student prize. This model contends that a profile of unpleasant moods is unhelpful for performance. Specifically, increased tension, confusion, anger and fatigue, with co-occurring depression appears to have a debilitating effect on performance. As such, we were interested in testing this model in the context of an online concentration grid task. In order to clarify our aims for emotional eating interventions, a start point was to identify emotions that appear to elicit eating. In the first of two systematic reviews, we found that negative mood, sadness, tension and instability of emotions were antecedents of binge eating in an adult binge eating disordered-obese sample (Nicholls *et al.*, 2015). A second review indicated that stress, depression and sadness consistently elicited increased food intake or poor nutritional food choices among normal and overweight adult populations (Devonport *et al.*, 2017). In both systematic reviews we noted that discrete, most often unpleasant emotions appear to lead to an episode of eating.

As a result of this research, one aim in developing online emotional eating interventions is to clarify those emotions that elicit a desire to eat. This will help produce knowledge of practical use for online users, and also contribute to research in this area. From the perspective of end users, the first stage in managing emotional eating is for individuals to recognise and understand it. As such, an online intervention will involve completion of a simple diary. Here users would be asked to make a note of any emotions they are experiencing (if any) at the point they recognise a desire to eat. They will also be asked to note what they want to eat, and the extent to which they feel hungry. The data produced will be analysed to establish those emotions commonly associated with a strong desire to eat.

A further lesson learned from the BBC project that will be applied in the development of emotional eating interventions, was the benefit of developing simple and engaging instructions for

the tasks that users were about to undertake. In the BBC project Michael Johnson guided users through the online intervention. We have developed cartoons as a means of introducing emotional eating to the general public (see www.youtube.com/watch?v=s78Q7LGoPbo) with feedback suggesting this to be an engaging and effective strategy. We intend to use similarly styled videos to explain to users why it is of benefit to reflect on emotions that associate with a desire to eat.

During these early stages of online intervention development, we are working through ways to gather data that is enjoyable for participants and can offer meaningful feedback. This is of importance as completion of mood and food diaries will underpin a second stage of the online intervention. Whilst food presents one way individuals can seek to regulate emotions, there are countless other means. Users will be encouraged to consider alternative ways of managing emotions. This could be using strategies such as exercise, a massage, playing with children, grandchildren or pets, watching a pre-recorded TV programme, talking to someone, taking action to change or address whatever is causing the emotion, the list goes on...

A likely intervention that will be provided to help manage emotional eating is mindful eating. Having reflected on emotions and eating, users should already be on the way to mindful eating. This is important because emotional eating can be a result of not being conscious of what or why you are eating. A great example of this is when we take a trip to the cinema, how often have you eaten all the popcorn before the adverts have finished and the film has started? Chances are you had not even recognised the popcorn disappearing. This is because your attention was elsewhere and you were not thinking about eating. Mindful eating involves bringing your full attention to the process of eating, to all the tastes, smells, thoughts and feelings that arise during a meal. This can be helped by slowing down when eating, taking time to savour and enjoy your food. Practical suggestions for eating more mindfully will be offered. This will include eating away from distractions such as the television, mobile phone and internet so that the focus is more likely to be on eating.

In developing the BBC project, we intensively tested all measures, interventions and guidance videos used as part of the online intervention. As a result of such testing, we established end users' preferences, which we feel increased uptake of, and adherence with the intervention. For example, we found that users preferred sliders rather than Likert scales to indicate the intensity of felt emotions. So in developing online measures and interventions for emotional eating, these will also be rigorously tested to identify user preferences and to identify and address technical problems (i.e. debugging). ■



Dr Tracey Devonport FBASES

Tracey is a Reader in Sport and Exercise Psychology at the University of Wolverhampton. She is a BASES accredited sport and exercise scientist and a British Psychological Society Chartered sport and exercise psychologist.

References:

- Devonport, T.J., Nicholls, W. & Fullerton, C. (2017).** A systematic review of the association between emotions and eating behaviour in normal and overweight adult populations. *Journal of Health Psychology*, 1359105317697813.
- Lane, A.M. & Terry, P.C. (2000).** The nature of mood: Development of a conceptual model with a focus on depression. *Journal of Applied Sport Psychology*, 12(1), 16-33.
- Lane, A.M. et al. (2016).** Brief online training enhances competitive performance: findings of the BBC Lab UK Psychological Skills Intervention Study. *Frontiers in Psychology*, 7.
- Nicholls, W., Devonport, T.J. & Blake, M. (2016).** The association between emotions and eating behaviour in an obese population with binge eating disorder. *Obesity Reviews*, 17(1), 30-42.

Ultra-endurance exercise: a model to examine the limits of physiological function

Dr Nick Tiller provides an overview of a series of studies investigating some of the physiological responses to an extreme-endurance exercise challenge recently contested in the UK.

Introduction

Ultra-endurance can be classified as any exercise bout of >6 h duration. Participation has steadily increased over the last 30 years, but despite its popularity as an athletic competition, most participants consider ultra-endurance exercise to be a means of personal accomplishment. The physiological demands of training and competition are multi-dimensional, and the absolute distance, variety of exercise mode, possible terrain and environmental conditions, make ultra-endurance one of the most physically gruelling of athletic contests. Consequently, the sport is an outstanding model with which to study the adaptive responses to extreme load and stress.

Due to relatively low participant numbers and the remote locations in which races are often contested, high quality data on the physiological responses are scarce. Further study would inform athletic training programmes and highlight the potential contraindications of prolonged, repetitive endurance exercise. Accordingly, this article overviews a series of studies, designed using a single research model, which investigated some of the physiological responses to an extreme-endurance exercise challenge recently contested in the UK. Included are some first-hand insights from the research team in which they describe the principal measures, and reflect upon the research process.

The 100-Peaks challenge

We designed and implemented a series of laboratory- and field-assessments to monitor the physiological responses to a pre-planned, charity-focused endurance challenge that took place throughout May and June 2017. The task was to ascend and descend 100 mountains (all elevations >600 m) throughout England (n=44), Scotland (n=45), Wales (n=10) and the Isle of Man (n=1) in 25 consecutive days. All peaks were summited on foot, and athletes cycled between five UK base-camps; the team covered a total distance of 840 miles (1,350 km) and a total elevation of 36,500 m. Although never previously attempted, the 100-Peaks has been described by Sir Ranulph Fiennes, one of the challenge ambassadors, as *one of the most extreme endurance challenges ever contested in the UK*. The challenge, therefore, provided an excellent opportunity to study the limits of human performance.

An integrated model

Studying the challenge and its physical impact required a range of expertise. Accordingly, we agreed upon a multi-institution research collaboration combining respiratory physiologists from Sheffield Hallam University, cardiologists from University College London and nutritionists from Anglia Ruskin University. Three interrelated studies were arranged to assess physiological responses to the challenge using a holistic, applied approach to performance research. Below, is a summary of the rationale and methods associated with each study.

Pulmonary function

A one-off marathon can cause significant reductions in respiratory muscle strength measured using maximal inspiratory and expiratory mouth-pressures (Ross *et al.*, 2008), and reductions in respiratory muscle endurance as measured using maximal voluntary ventilation (Mahler & Loke, 1981). Moreover, using magnetic nerve stimulation to artificially activate the respiratory muscles, Wuthrich *et al.* (2015) observed significant reductions



Above: Assessing lung function in the field using portable respiratory equipment
Courtesy Nick Tiller

in mouth-twitch pressures following a 110 km mountain ultramarathon, suggesting that the inspiratory muscles are susceptible to fatigue following ultra-endurance exercise. Notwithstanding the absolute exercise durations, the use of heavy backpacks for transporting essential equipment can attenuate forced vital capacity and increase the work of breathing (Dominelli *et al.*, 2012). An important, yet undetermined, component of respiratory function is the influence of endurance exercise, repeated daily over several weeks, and whether there is a cumulative impact on respiratory muscle fatigue.

"At baseline, and within 48 hours of the final day, we made some laboratory measurements of pulmonary volumes, capacities and flows via standard spirometry. The key measures, however, were made using a fully-integrated body plethysmograph, which provided feedback on airway resistance (the resistance of the respiratory tract to airflow), and we used the single-breath (carbon monoxide) diffusion test to estimate the ability of the alveoli to diffuse oxygen into the systemic circulation. Moreover, to quantify the degree of respiratory muscle fatigue, we measured the maximal pressure-generating capacity of the respiratory muscles using a mouth-pressure meter. It was important to assess the cumulative effects of prolonged exercise, so I followed the team throughout Scotland and the Lake District to monitor respiratory function using portable equipment. Getting good data in the field was a unique challenge, particularly when the weather conditions took a turn for the worse. It tested my resolve as a researcher, but ultimately provided us with some strong, ecologically valid data."

DR NICK TILLER, SHEFFIELD HALLAM UNIVERSITY

Cardiovascular structure and function

Ultra-endurance exercise also has the potential to cause several maladaptive cardiovascular responses. Training for and competing in marathon, ultramarathon or Ironman may compromise cardiac pumping capacity via reductions in right ventricular ejection fraction (O'Keefe *et al.*, 2012). Moreover, chronic training (over months and years) can lead to patchy myocardial



Above: Members of the 100-Peaks challenge team
Courtesy Nick Tiller

fibrosis, cardiac arrhythmias (O'Keefe *et al.*, 2012), and changes in cardiac structure and function that reflect pathological states in trained athletes. Further insights into the cardiovascular responses to ultra-endurance will offer guidance on the potential contraindications and help inform the future of participation. Accordingly, this arm of the investigation aimed to: 1) assess changes in cardiac structure and function in response to extreme-endurance exercise contested over a period of 25 days; and 2) assess changes in vascular structure and function.

"Before and after the challenge we measured cardiac structure using echocardiography (DICOM cineloops) and cardiac conductance via 12-lead ECG. There is a paucity of data on the vascular changes that occur during prolonged, repetitive exercise, and so we measured carotid artery thickness, diameter and distensibility using ultrasound, and arterial stiffness using pulse-wave velocity. We were also interested in the markers of macrovascular and microvascular function as we know this can change with prolonged exercise. Although intended only for research purposes, these tests served as an important aid to medical screening, and any abnormalities would have been referred to a specialist. Fortunately, there were no detectable contraindications, and the athletes could compete unencumbered. There are few studies that have used such comprehensive measures to assess the cardiovascular response to extreme-endurance exercise, and we think these data will provide an interesting addition to the literature."

DR SCOTT CHIESA, UNIVERSITY COLLEGE LONDON;
INSTITUTE OF CARDIOVASCULAR SCIENCE

Nutritional and gut endotoxin profiles

Successful completion of ultramarathon is strongly correlated with adequate energy and fluid consumption (Kruseman *et al.*, 2005) and, therefore, successful performance in ultra-endurance events requires careful consideration of nutritional issues. Moreover, gastrointestinal (GI) distress is a common complaint among ultramarathon runners (~80% prevalence) and can result in non-completion. Gastrointestinal complaints are often associated with the release of intestinal endotoxins from gram negative bacteria into the circulation, which can cause an inflammatory state, and negatively impact on long-term health (Maitra *et al.*, 2012). As such, this study aimed to assess gastrointestinal symptoms (frequency and intensity) during the 100-Peaks challenge, and assess blood markers of endotoxin units and I-FABP to characterise potential gut-damage. Since there is a paucity of data pertaining to the nutritional profiles of well-trained ultra-endurance athletes, an additional aim was to assess the nutritional intakes of the athletes before and during the challenge.

"To assess pre-challenge nutritional intake, athletes were asked to complete a 4-day food diary and, to supplement the food diary, we also conducted a brief recall interview. Athletes were also asked to report GI symptoms in the week preceding baseline testing, all of which were repeated at days 7, 14 and 21 during the challenge. One of our key measures was to assess endotoxin profiles. We did this by collecting fasted venepuncture blood samples, in the lab and in the field, separating the whole-blood via centrifuge, and storing samples at -80°C for further analyses. I've had plenty of experience collecting such data in the field, but the team cared about the results as much as we did, and so were really compliant. The only real challenge was ensuring the samples were transported at the appropriate temperatures. Field data is extremely important for this type of event, since the real adaptations do not occur in the lab. Our preliminary data indicate an energy expenditure of 4,000 - 6,000 kcal·d⁻¹, suggesting substantial energy demand, which had to be congruent with their nutritional strategy."

CRAIG SUCKING, ANGLIA RUSKIN UNIVERSITY;
FACULTY OF SCIENCE AND TECHNOLOGY

Conclusions

With the challenge only recently concluded, we are now in the process of analysing the preliminary data in the hope of publishing our main findings in the coming months. I suspect that our observations will highlight various components of body systems that are innately fallible, but others that exhibit tremendous robustness in the face of extreme physiological stress. We are far from being the first group to implement an integrated, collaborative approach to applied research, or to use a single design to address a series of research questions. However, we hope to build on these foundations to continue exploring exercise responses using such a model, and encourage others to do the same; only then can we develop a more complete picture of human physiological function. ■



Dr Nick Tiller

Nick has supported Olympic performance programmes in the UK, and is now a Lecturer and Researcher at Sheffield Hallam University.

References:

- Dominelli, P.B., Sheel, A.W. & Foster, G.E. (2012).** Effect of carrying a weighted backpack on lung mechanics during treadmill walking in healthy men. *European Journal of Applied Physiology*, 112(6), 2001-2012.
- Kruseman, M. et al. (2005).** Nutritional intake and performance during a mountain marathon: an observational study. *European Journal of Applied Physiology*, 94(1-2), 151-157.
- Mahler, D.A. & Loke, J. (1981).** Pulmonary dysfunction in marathon runners. *Yale Journal of Biological Medicine*, 54(4), 243-248.
- Maitra, U. et al. (2012).** Molecular mechanisms responsible for the selective and low-grade induction of proinflammatory mediators in murine macrophages by lipopolysaccharide. *Journal of Immunology*, 189(2), 1014-1023.
- O'Keefe, J. et al. (2012).** Potential adverse cardiovascular effects from excessive endurance exercise. *Mayo Clinic Proceedings*, 87(6), 587-595.
- Ross, E. et al. (2008).** Changes in Respiratory Muscle and Lung Function Following Marathon Running in Man. *Journal of Sports Sciences*, 26(12), 1295-1301.
- Wuthrich, T.U. et al. (2015).** Aspects of respiratory muscle fatigue in a mountain ultramarathon race. *Medicine and Science in Sport and Exercise*, 47(3), 519-527.



Fitness versus fatness continues to bring newsworthy confusion!

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

Can *fitness* compensate for the adverse health effects of excess body fatness? Results of a large-scale cohort study involving 3.5 million participants presented at the European Congress on Obesity in May this year (publication pending) reopened this debate amongst the media and internet bloggers. The study was undertaken by researchers at Birmingham University and showed that *metabolically healthy obese* people (those without cardiometabolic abnormalities) were more likely to experience coronary heart disease, heart failure and cerebrovascular disease than healthy weight people (Caleyachetty *et al.*, 2017). The media were quick to pounce, with headline messages such as ‘*Fat but fit is a big fat myth*’ (BBC News website), no doubt generating a lot of confusion due to previous conflicting messages.

This debate is built on evidence from a growing body of disparate cohort studies, which seems to be fanning the flames of confusion. Furthermore, a limitation of many cohort studies is that they only investigate *associations* between a health outcome (e.g. mortality) and another variable (e.g. cardiopulmonary fitness, BMI, etc.) measured at a snap-shot in time some years earlier. A prime example is the recently published study of Hogstrom *et al.* (2016), which appears to corroborate the Birmingham data by reporting a 30% lower risk of all-cause mortality during an average follow-up duration of 29 years in unfit normal weight adolescent men compared to their fit but obese counterparts. However, no data on health behaviours, anthropometric or fitness variables were available during the follow-up period and a similar proportion of deaths (~35%) was due to trauma or suicide as was due to diseases linked to overweight/obesity, e.g. CVD or cancer.

The broad range of participant characteristics across different cohort studies, lack of female participants, variability in follow-up durations and clinical end-points, limitations of BMI as a measure of body fatness and selective attention paid to certain results by the media only adds to the confusion. Regarding the latter, because cohort studies often yield a range of hazard ratios, it is easy to ‘cherry-pick’ results that confirm a particular viewpoint, while overlooking other results that may contradict or weaken an argument. For example, the Hogstrom *et al.* study also showed that obese men with higher levels of cardiopulmonary fitness had a 26% reduced risk of all-cause mortality compared to their less fit obese counterparts, providing clear evidence of the importance of cardiopulmonary fitness in obese populations.

The *fitness versus fatness* debate has also thrown up some key discussion points on “health” and “fitness” - relative concepts that should not be considered synonymous! Some cohort studies have prompted headline statements in the media about *fitness versus fatness* in the absence of any objective measure of cardiopulmonary fitness. For example, *metabolically healthy obesity*, defined as the absence of (or <2) metabolic syndrome characteristics in some studies (e.g. Kramer *et al.*, 2013; Caleyachetty *et al.*, 2017), has been interpreted as a favourable level of fitness by some sectors of the media. This may not be the case (Ortega *et al.*, 2015) - but has fuelled even more misleading headlines. Studies show that even *metabolically healthy obese* people are significantly more likely than healthy normal weight people to be insulin resistant and hypertensive within 5 years (Bell *et al.*, 2015) and they are at increased risk of adverse long-term

outcomes (Kramer *et al.*, 2013). In contrast, where objective measures of cardiopulmonary *fitness* have been included in cohort studies, they have generally reported higher hazard ratios for all-cause mortality in less fit obese individuals (Barry *et al.*, 2014). Furthermore, higher cardiopulmonary fitness appears to counter the predisposition to adverse long-term health outcomes in the *metabolically healthy obese* (Ortega *et al.*, 2013). For example, mortality benefits in fit obese individuals have been shown to be comparable with normal weight fit individuals in some studies (e.g. Ortega *et al.*, 2013; Barry *et al.*, 2014) and may even exceed those for normal weight unfit individuals (e.g. Fogelholm *et al.*, 2010).

“This latest media kerfuffle shows that the fitness versus fatness debate is destined to remain a newsworthy bone of contention amongst journalists and bloggers for some time to come.”

So, although being fat and unfit is clearly undesirable, the weight of available evidence appears to reject the hypotheses that *fat and fit* is a paradox, oxymoron or myth! In fact, the *big bottom line* is that improved cardiopulmonary fitness provides future mortality benefits to people of all shapes and sizes - but the probability of living a long healthy life is likely to be inversely related to distance from the *lean, metabolically healthy and fit* phenotype. Regardless, this latest media kerfuffle shows that the *fitness versus fatness* debate is destined to remain a newsworthy bone of contention amongst journalists and bloggers for some time to come. ■



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.

References:

- Barry, V.W. *et al.* (2014).** Fitness vs. fatness on all-cause mortality: a meta-analysis. *Progress in Cardiovascular Diseases*, 56, 382-390.
- Bell, J.A. *et al.* (2015).** Incidence of metabolic risk factors among healthy obese adults. *Journal of the American College of Cardiology*, 66, 871-876.
- Caleyachetty, R. *et al.* (2017).** “Healthy” obese people are still a heart risk. Oral presentation OS2:OC54, European Congress on Obesity, Porto, Portugal, May 2017.
- Fogelholm, M. (2010).** Physical activity, fitness and fatness: relations to mortality, morbidity and disease risk factors. A systematic review. *Obesity Reviews*, 11, 202-221.
- Hogstrom, G. *et al.* (2016).** Aerobic fitness in late adolescence and the risk of early death: a prospective cohort study of 1.3 million Swedish men. *International Journal of Epidemiology*, 45, 1159-1168.
- Kramer, C.K. *et al.* (2013).** Are metabolically healthy overweight and obesity benign conditions? A systematic review and meta-analysis. *Annals of Internal Medicine*, 159, 758-769.
- Ortega, F.B. *et al.* (2013).** The intriguing metabolic healthy but obese phenotype: cardiovascular prognosis and of fitness. *European Heart Journal*, 34, 389-397.
- Ortega, F.B. *et al.* (2015).** Role of Fitness in the Metabolically Healthy but Obese Phenotype: A Review and Update. *Progress in Cardiovascular Diseases*, 58, 76-86.



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If Only I Knew Then What I Know Now

What advice would you give to your 21-year-old self?

Dr Costas I. Karageorghis FBASES works his network to provide some golden nuggets of advice.

I don't know whether you have ever had the thought "If only I knew then what I know now"? It is a thought that often plays on my mind and so, when BASES kindly awarded me an International Conference Grant to attend the 2017 International Society of Sport Psychology (ISSP) World Congress in Seville, Spain, I decided to ask some of the luminaries in my field whether if a time machine were to become available, what single piece of advice they would give to their 21-year-old selves. I hope that the responses of the eminent scholars will resonate with the young as well as the not-so-young. The advice offered transcends disciplinary boundaries and so every BASES member should find at least one 'golden nugget' in here.

Prof Peter Crocker (The University of British Columbia, Canada) was the discussant for a symposium that I organised and the first delegate who I met on arrival in Seville. Perhaps alluding to the theme of our symposium, which concerned a paradigmatic shift from cognitivism to hedonism in exercise psychology, he said that you should avoid getting caught up in one epistemological position; be open-minded because taking a blinkered/mono-theoretical approach can restrict your progress and understanding. I then bumped into Loughborough University's latest addition to the professoriate, Prof Christopher Harwood FBASES, who would advise his younger self to fully see through a particular approach (e.g. goal-orientation theory). He went on to elaborate that when you're a young scholar, you might well know more about a given topic than your supervisor. Invariably s/he will have to attend to so many matters each day that reading time is severely restricted. Through reading, you can discover many ways in which a particular approach can be developed.

Staying with the theme of reading, John Curtin Distinguished Professor of Psychology, Nikos Ntoumanis (Curtin University, Australia), offered the advice that as an aspiring psychologist, you should read intensely and broadly (i.e. beyond the confines of your own discipline), as this is the time in your life when you will have the most time to read. To bolster your learning and understanding, Prof Stuart Biddle FBASES (University of Southern Queensland, Australia) advised that you can gain a huge amount from teaching experiences. He told me about the wide variety of topics that he taught during his early years in academe. Biddle is in league with Einstein who said that if you can't teach it *simply* then you don't know it well enough.

The University of Birmingham's Dr Maria Kavussanu, an invited keynote speaker on sport morality, provided one of the

most insightful responses. She said that, whenever possible, you should avoid saying "no" to "important people". Sometimes your resistance to a suggestion from a superior at work can come back to bite you. Prof Susan Backhouse FBASES (Leeds Beckett University) gave a response that could provide extracts for a printed T-shirt: No one has it all figured out, everyone is just trying really hard to make it seem that way. Embrace the uncertainty and trust your gut instinct.

Prof Diane Gill (University of North Carolina, USA) indicated that you should decide early on what the priority for your career will be: that is consultancy versus research. So either start a research line that has long-term potential or be sure to acquire excellent consultancy skills. Along similar lines, Prof Bonnie Berger (Bowling Green State University, USA) suggested that you should decide whether you want to pursue the sport route (i.e. working with a small number of elite people) or the exercise route (i.e. working with a large number of people from the general population). The implication from the advice of both American scholars is that it's better to be at the bottom of a ladder that you want to climb, than half-way up one you don't!

Perfectionism expert Dr Andrew Hill (York St John University) advised that in deciding where you want to work, find a place that provides the best fit for you - it doesn't have to be a Russell Group institution. The work intensity of the Russell Group is such that many aspiring academics crash and burn. A mid-ranking institution can provide the perfect balance between teaching and research, as well as between professional endeavours and a family life.

It is notable that none of the experts repeated any of the advice of their colleagues - this is a coat of many colours. It is thus down to you to consider what they have said and to gauge which, if any of their messages resonate most strongly for you. And if I were asked to respond to my titular question, what to say? Hmmm, perhaps when you are attending the ISSP World Congress and it's the hottest day ever recorded in Spain (48°C), decline the organisers' invitation to go on the open-bus tour of Seville. ■



Dr Costas I. Karageorghis FBASES

Costas is a reader in sport psychology at Brunel University London. His latest book is entitled *Applying Music in Exercise and Sport* (Human Kinetics, 2017). He is a BASES accredited sport and exercise scientist and was invited to submit this article as a winner of a BASES International Conference Grant.



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DAY 1 - TUESDAY 28 NOVEMBER 2017				
07:30-08:45	Exhibitor set up			
09:00	Registration and drinks			
10:00	Opening address Welcome from Dr Keith Tolfrey FBASES, Chair of BASES and Dr Anne-Marie Elbe, FEPSAC President			
10:10-11:10	Invited keynote: Developing a high performance culture: recommendations for research and practice Dr Angus Mugford, Head of Performance Services, Toronto Blue Jays, Canada Chair: Prof Chris Harwood FBASES This keynote will draw upon insights and experience of developing a high performance culture in North American professional sport, focusing on the challenges and opportunities that impact academics and practitioners in the field of applied sport science, particularly around interdisciplinary work in the context of professional environments.			
11:10-11:30	Poster viewing, exhibition and refreshments			
11:30-12:45	Parallel invited symposia			
	Physical activity and sedentary behaviour: measurement, interpretation and implementation Prof Adrian Bauman, The University of Sydney, Australia and Prof Dylan Thompson, University of Bath Chair: Prof Mike Duncan FBASES In this session Prof Dylan Thompson will explain the multidimensional nature of physical activity and discuss some new techniques and approaches for physical activity monitoring. Prof Adrian Bauman will critically evaluate the evidence relating to sitting behaviour and health outcomes and will assess the challenges inherent in translating research into practice.	Performance at the extremes: high, hot and cold BASES expert statement highlight session Prof Greg Whyte OBE, FBASES, Dr Jo Corbett, University of Portsmouth, Prof Mike Tipton, University of Portsmouth and Mark Homer, British Rowing Chair: Prof Greg Whyte OBE, FBASES The ability to cope with the challenges of extreme environments is crucial for performance and health. Our understanding of the complex interaction of the human body in extreme environments has continued to evolve, leading to athletes pushing the limits of human performance. This session is a roundtable discussion of the BASES expert statement on performance and health in high, hot and cold environments.	Mental health problems in elite athletes: systems, challenges and recommendations for practice Prof Jens Kleinert, German Sport University, Cologne, Dr Göran Kenttä, Swedish School of Sport and Health Sciences, Cédric Guignon-Fleuret, Institute of Sport, France and Dr Kate Goodger, Chimp Management Chair: Dr Karin Moesch This roundtable focuses on mental health problems in elite athletes. Participants from different countries will provide insight into how elite athletes with mental health problems can be supported, with a focus on prevention, detection and treatment of mental health problems in this specific population. Recommendations will be discussed to further enhance clinically oriented sport psychology services.	
12:45	Lunch			
13:15-14:15	Poster discussions and exhibition			
14:15-15:45	Parallel free communication sessions			
15:45-16:05	Exhibition and refreshments			
16:05-17:20	Parallel invited symposia			
	The adaptive response of human skeletal muscle to physical (in)activity: considerations for nutritional optimisation Dr Benjamin Wall, University of Exeter and Dr Oliver Witard, University of Stirling Chair: Prof Emma Stevenson Skeletal muscle tissue exhibits great plasticity depending on the mechanical strain imposed upon it. This session will discuss the physiological mechanisms underlying the adaptive response to increased, and decreased, physical activity; and address how the adaptive response to structured exercise training can be optimised via considerations relating to dietary protein. The session's conclusions will aim to provide up-to-date recommendations for dietary protein intake in endurance and resistance trained athletes.	Biomechanical and neuromuscular challenges during ageing and disuse Dr Ramona Ritzmann, University of Freiburg, Germany and Associate Prof Claudine Lamoth, University of Groningen, Netherlands Chair: Dr Florentina Hettinga This session will provide an insight into adaptations in response to ageing, with a particular focus on biomechanical and neuromuscular changes. Data obtained about the mechanisms underlying degradations in response to inactivity during bed rest and immobilisation will be systematically reviewed and various countermeasures designed to reduce these effects will be discussed.	Challenges in the provision of psychology support for performance excellence during the Rio Olympic and Paralympic Games Prof Paul Wylleman, Vrije Universiteit Brussel, Belgium and Dr Kristoffer Henriksen, University of Southern Denmark Chair: Dr Rachel Arnold This session will highlight the contrasting challenges regarding the content, organisation and quality of support provided to Olympic and Paralympic athletes by team psychologists at Rio 2016. Drawing from their experiences, critical insights will be offered on support provision; the organisation and effects of a solid performance culture; and on the competency profiles of practitioners working with elite athletes.	Interdisciplinary research on physical activity interventions targeting obesity and smoking cessation Prof Antonis Hatzigeorgiadis, University of Thessaly, Greece and Prof Anne-Marie Elbe, University of Copenhagen, Denmark Chair: Prof Anne-Marie Elbe This session will cover interdisciplinary research conducted on two physical activity interventions. The first targets smoking cessation and the collection of psychological and biochemical data. The second investigates the effects of an intense lifestyle intervention for individuals with obesity, combining a physiological, psychological and sociological research perspective. Advantages and challenges of interdisciplinary physical activity research will be outlined.
17:30-18:30	BASES Annual General Meeting		FEPSAC Annual General Meeting	
19:00	Gala drinks reception			
19:30	Conference dinner			

DAY 2 - WEDNESDAY 29 NOVEMBER 2017

08:00-09:00 Registration and drinks

08:15-09:10 Parallel 5 slides in 5 minutes free communication sessions

09:15-10:10 Invited keynote: **Virtual reality technology: what use can it have in sport?**

Prof Cathy Craig, Queen's University Belfast, N. Ireland Chair: Prof Markus Raab

This keynote will show how immersive, interactive virtual reality technology is used to study decision-making in sport. The versatility of this technology means it can be easily applied to many sports and allows for the accurate recording of players' movement responses. By manipulating the visual information presented to players in the virtual world and subsequently measuring when and how they respond, new insights into players' decision-making abilities can be obtained.

10.15-11:10 Parallel invited symposia

Exercise in older adults

Prof Steve Harridge, Kings College London and Dr Katherine Brooke-Wavell, Loughborough University

Chair: Dr Miranda Armstrong

In this session Prof Steve Harridge will examine the decline in physiological systems that occur with ageing and discuss studies in master's athletes to assess the extent to which declines in functional capacity are due to ageing *per se* versus physical inactivity. Dr Katherine Brooke-Wavell will then share her knowledge on the potential for exercise to increase bone strength and reduce the risk of falls and osteoporotic fractures in older adults. This will include an examination of the different types and intensities of exercise for increasing bone density.

Inadvertent doping in sport: protecting the athlete, the practitioner and the profession

BASES expert statement highlight session

Prof Susan Backhouse FBASES, Leeds Beckett University, Dr Ian Boardley, University of Birmingham and Mike Stow, English Institute of Sport

Chair: Prof Susan Backhouse FBASES

This session will consider the controversial issue of doping in sport, and in particular, the unintentional use of prohibited substances or methods. This session will use collaborative technology to activate the BASES community and gauge their stance on the BASES expert statement on inadvertent doping in sport.

Sport psychophysiology

Associate Prof Maurizio Bertollo, University of Chieti-Pescara, Italy, Prof Lorenza Colzato, Leiden University, Netherlands and Prof Christopher Ring, University of Birmingham

Chair: Associate Prof Maurizio Bertollo

This session will provide an overview of the psychophysiological features of optimal and suboptimal performance in sport. Presenters will discuss the neural markers underlying performance experience and the effect of non-invasive brain stimulation on performance. The conclusion of this synthesis is applicable within performance enhancement and mental training programmes, providing a comprehensive perspective on psychophysiological intervention in sport.

11:10-11:30 Poster viewing, exhibition and refreshments

11:30-12:45 Parallel free communication sessions

12:45 Lunch

12:50-13:45 Poster discussions and exhibition

13:45-14:45 Parallel invited symposia

Nutrition, exercise and appetite: hungry for more?

Prof Emma Stevenson, Newcastle University and Dr Lewis James, Loughborough University

Chair: Dr Mike Price FBASES

This session will focus on the impact of alterations in energy balance through energy restriction and exercise on appetite and energy balance regulation. There will be particular focus on novel dietary strategies to attenuate energy balance, including intermittent severe energy restriction and time restricted feeding.

Analysing, modelling and improving Olympic performance

Prof Gareth Irwin, Cardiff Metropolitan University and Prof Bert Otten, University of Groningen, Netherlands

Chair: Adam Hawkey

Many aspects of Olympic performance can be analysed with motion capture and simulated with custom models. Drawing on current research examples from amputee sprinting, gymnastics, track cycling and speed skating, this session will demonstrate how ecologically valid research in biomechanics, aerodynamics and motor control can enhance the performance of Olympic athletes.

Uncovering the process of a strength-based approach to mental skills training with young people

Dr Jennifer Cumming, University of Birmingham and Dr Camilla Knight, Swansea University

Chair: Prof Zoe Knowles FBASES

This session will explore the delivery and evaluation of strength-based approaches to mental skills training in elite sport and hard to reach populations. Strategies and activities will be shared which have facilitated the application of mental skills training across various settings, as well as insights into the successes and challenges encountered in delivering strength-based mental skills training programmes.

Direct perception in applied contexts

Prof Cathy Craig, Queen's University Belfast, N. Ireland, Prof Rita Cordovil, University of Lisbon, Portugal, Dr Rita de Oliveira, London South Bank University and Prof Keith Davids, Sheffield Hallam University

Chair: Dr Rita De Oliveira

The direct perception approach posits that perception is unmediated by cognition, with consequences to how we organise both research and practice. Talks in this symposium will explain how key concepts from this approach can be used to guide research methodology and practical applications in exercise and sport.

14:55-15:45 Invited keynote: **Exercise versus pharma: what is the future of healthcare?**

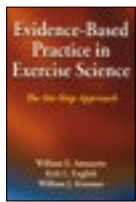
Prof Sir Muir Grey and Dr Chris van Tulleken Chair: Prof Greg Whyte OBE, FBASES

Prof Greg Whyte OBE, FBASES will host a discussion with Prof Sir Muir Gray and Dr Chris van Tulleken on the importance of exercise in healthcare. As Chief Knowledge Officer at the NHS, and a public health consultant, Prof Sir Muir Gray will provide insight on the preventative agenda. BAFTA award winning TV presenter, Dr Chris van Tulleken, will then explore the role of exercise prescription in primary care following his recent documentary *The Doctor Who Gave up Drugs*. Expect stimulating debate and audience participation on the role of exercise in the prevention, treatment and management of disease and views on how the health service can move forward.

15:45 Awards announcement and closing address

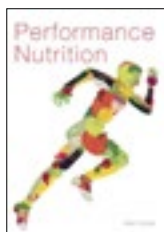
Dr Keith Tolfrey FBASES, Chair of BASES and Dr Anne-Marie Elbe, FEPSAC President

Reviews - books and apps



Evidence-Based Practice in Exercise Science: The Six Step Approach
Amonette, W.E., English, K.L. & Kraemer, W.J. (2016)
Human Kinetics
Hardback £60.29 and Kindle £44.99 from www.amazon.co.uk

A perfect storm is brewing! The immediacy and availability of information coupled with an accelerated rate of research output leaves applied practitioners finding it increasingly difficult to maintain currency. This excellent and timely book reminds us, that despite these challenges, our practice should strive to be informed by the latest, most relevant, least biased and highest quality information; not the material that shouts loudest. The book is neatly structured; opening with five chapters setting the practical and philosophical scene for evidence-based practice and concluding with chapters outlining how evidence-based practice can be integrated into practice. Between are the two consistently engaging and thought-provoking parts; one presenting the six steps of evidence-based practice, with the chapters relating to searching and evaluating evidence being particularly valuable for the applied researcher. The second presents excellent case study material, which can be readily adapted for every level of teaching. The authors are to be commended for a valuable addition to the resources for teaching critical thinking and evidence-based practice across the curriculum. I particularly like the emphasis on multi-disciplinary work and a clear conclusion that the integration of high quality evidence into practice is how applied sport science is driven forward.
DR TONY WESTBURY, EDINBURGH NAPIER UNIVERSITY
Rating 10/10



Performance Nutrition
Kevin Currell (2016)
The Crowood Press Ltd
Paperback £14.88 and Kindle £8.49 from www.amazon.co.uk

This book authored by Dr Kevin Currell (previously Head of Performance Nutrition at the English Institute of Sport) "provides an overview of how nutrition can be used to maximise human performance." This book provides evidence-based application on nutrition to prevent illness, nutrition for injury, maximising adaptations (strength training, endurance training and concurrent training), team sport performance and weight management. Each chapter starts with a narrative on the topic and what the current evidence suggests; with diagrams and tables to help to digest this information. The chapter ends with a summary, rankings of each intervention based on the strength of the evidence (which is extremely useful) and an example meal plan. This book firmly promotes the use of food to achieve the associated outcomes, but nutritional supplementation (what works and what doesn't) is also discussed. Practitioners not specialising in nutrition, but wanting to understand how nutrition can improve performance without delving too deeply into nutritional biochemistry; I would recommend adding this to your reading list.
PETER BONNER, SPORTSCOTLAND INSTITUTE OF SPORT
Rating 8/10



The Talent Lab: The Secrets of Creating and Sustaining Success
Slot, O. (2017)
Ebury Press
Hardback £20.00 and Kindle £9.99 from www.amazon.co.uk

This book consists of a series of short story-type sections written by leading GB athletes under five key chapters associated around the broad concept of talent. The chapters note reflections on transformational leadership, winning environments, performance and sustaining success from athletes including Daly, Ennis-Hill, Hoy, the Brownlee brothers and an introduction from Adam Peaty. This was a very different type of sport and exercise science text and one that is illuminated by personal experience and interpretations of the key concepts at the highest level of competition. The short story-telling approach is very engaging and certainly reflects the books synoptic trailer as the inside story on how the cutting-edge insight of elite performance helped Britain to develop into an Olympic superpower. There are many references to the role of sport and exercise science in this development, although not in scientific detail, and to some extent there are lessons to be learnt for future sport and exercise scientists and existing academics on what needs to be taught and researched to maintain this development. These are clearly noted at the end of each chapter under 'Chapter Learnings' and are very real given the experience of the authors involved.
DR LANCE DOGGART FBASES,
UNIVERSITY OF ST MARK AND ST JOHN, PLYMOUTH
Rating 8.5/10



App Name: **Calm**
App Developer: **Calm.com, Inc.**
App Cost: **Free**
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Calm is a mindfulness meditation that can help with stress resilience, improve sleep quality, concentration and much more. The app is for beginners, but also includes hundreds of programmes for intermediate and advanced meditators. Guided meditation sessions are available in lengths of 3-25 minutes. The app is based on real research that is tried and tested, and it is supported by a dedicated support network that keeps the app running smoothly. The app is user-friendly and has a very clean and simplistic layout with three main tabs along the bottom (Breathe, Meditate and Sleep). The app displays your progress, FAQs, settings and options for sharing your results, there is also a supporting website. Like most mindfulness apps the biggest drawback are subscription costs. While there is no need to subscribe to enjoy the app, additional lessons/stories are only available to subscribers at a costly premium. Overall, out of the many mindfulness meditation apps I have used, this is by far my favourite. It is packed with great features that are fun to use. One feature is the sleep stories, they are soothing stories from well-known voices, really adding a unique twist to this app.
JAMES HICKMAN
Rating 10/10

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

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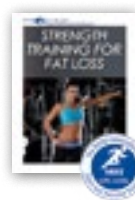
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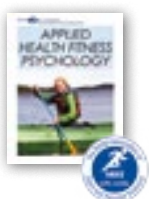
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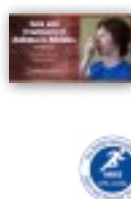
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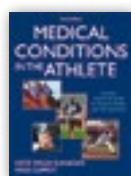
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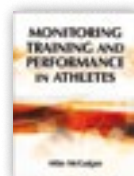
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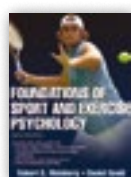
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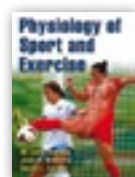
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HUMAN KINETICS

A review of the BASES Position Stand on Curriculum-based Work Placements in Sport and Exercise Sciences

Dr Lance Doggart FBASES, Ryan Thomas, Philippa Elford and Sarah Catlow evaluate the implementation of the BASES Position Stand on Curriculum-based Work Placements in Sport and Exercise Sciences.

In 2014 Board *et al.* produced, on behalf of BASES, a position stand on Curriculum-based Work Placements in Sport and Exercise Sciences. In 2015-16-17 academic years Plymouth Marjon University, Faculty of Sport and Health Sciences, incorporated the guidelines into existing policy and procedures for undergraduate students. At the end of both academic years feedback, specific to the guidance and recommendations in the position stand (post-work placement higher education institutions responsibility), was collected from all stakeholders including placement providers, students, academic staff and the University Placement team. This article reports on the feedback obtained and provides updates/recommendations relating to the position stand.

Effective placements and stakeholder responsibilities

Feedback from students was overwhelmingly positive about their placement experience. Over 85% of students noted that they perceived an 'increase in confidence' and/or the development of 'employability skills' that may not have otherwise been taught. Placement provider responses also mirrored those already reported in the BASES Position Stand and further noted the importance of placement students in successfully planning/completing/assisting with projects and in the utilisation of a different skill set for their respective organisations. Many aspects appear to step into the realms of graduate internships and it may be that higher education institutions would wish to clarify curriculum-based work placements from internships using Pye *et al.* (2013) as a basis for differentiation. Nonetheless, 87% of providers also noted that students on placement were either offered paid employment or further extended voluntary employment following the initial placement completion. It was, however, interesting to note that the placement providers did not see it as a staff development opportunity for their existing staff around mentoring and managerial skills. Academic staff feedback noted additional benefits from an effective placement including having an overview of industry developments and challenges, which could lead to wider curriculum enhancement and changes, and reporting a more flexible way of teaching.

Stakeholder responsibility was clearly highlighted in the Position Stand and feedback was very positive around that process. However, students did convey some confusion on the role of the academic staff member when they were on actual placement days. This was specifically noted in terms of their role in communicating with the academic and if the academic should periodically attend the placement venue to evaluate the suitability and experience offered. The BASES Position Stand clearly articulates that the information provided is non-exhaustive guidance and so the attendance, communication channels and lead communicator are at the discretion of the higher education institutions. Nonetheless, it may be of consideration to have the initial meeting between all parties at the placement venue where the placement learning agreement can be developed and guidance on all aspects of communication discussed and included in the agreement.

The placement learning agreement

The placement learning agreement (PLA) is the administrative key to a successful placement. Although academic staff and students engaged with the PLA from the onset, feedback from the placement providers suggested that this document did not provide anything more than a contract of agreement in relation

to providing the placement and the hours required to fulfil the module requirements. There was guidance in the PLA on what the work-based experience would potentially encompass but further placement provider engagement with the PLA was superficial. Academic staff reported that after the PLA had been signed students tended to forget about this and certainly did not refer to it in the assessment processes required in the module. This was also noted in the student feedback, which suggested that although the PLA was important for setting the scene and boundaries of the placement it was not referred to again in any of the survey question responses. A successful solution to this lack of engagement with the PLA was developed, which detailed a checklist corresponding to exact responsibilities and timescales for each stakeholder, supported by feedback from providers.

Conclusion

Curriculum-based work placements are vital for providing course specific 'taster' employment opportunities and future career experiences. The placement remains highly valued by all involved providing the administrative burden can be managed appropriately. The PLA appears to be the vital component in a successful placement and should be the default 'go-to' document for academic staff, placement providers and students throughout the duration of the placement. The BASES Position Stand has recognised the PLA as a key component, however, feedback suggests that the magnitude of the PLA importance is quite substantial and is at the core of the whole process pre, during and post the placement in providing a successful experience. The current BASES Position Stand, although noting the PLA importance pre and post the experience, may wish to reinforce the PLA more overtly in the 'during' phase of the good practice guidelines proposed and note the PLA as a live working document, shaping the experience, throughout the whole process. Higher education institutions may wish to consider how the assessment of curriculum-based work placements reflects the content of the PLA and the placement effectiveness. Indeed it may be that the BASES Position Stand could suggest appropriate assessment methods to support the HEI and sport and exercise students in reflecting on the complete experience using the PLA as the basis for this. ■



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Sarah Catlow

Sarah is a programme leader and placement supervisor in the Faculty of Sport and Health Sciences at Plymouth Marjon University.

References:

- Board, L. et al. (2014).** The BASES Position Stand on Curriculum-based Work Placements in Sport and Exercise Sciences, *The Sport and Exercise Scientist*, 40, 6-8.
- Pye, M. et al. (2013).** The BASES Position Stand on Graduate Internships, *The Sport and Exercise Scientist*, 36, 1-3.

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Beyond chronological age

Rich Kite discusses the benefits of measuring biological age for talent identification in sport.

The traditional model of talent identification and detection focuses on identifying potentially talented athletes for further development and usually concentrates on specific chronological ages. Practice is usually associated with the assessment of physical qualities that are directly associated with the tested sporting discipline. Inherent with the current talent identification and detection models and such testing is an anticipated biological bias. This article attempts to outline the inherent bias and propose a manner of advancing the talent identification and detection process. It is believed that this will not only benefit inclusivity, but it will most importantly improve the realisation of talented athletes through the identification and comparison of performance by biological age.

“National governing bodies and similar organisations have heavily adopted talent identification and detection models in attempts to enhance future performances.”

Talent identification

National governing bodies and similar organisations have heavily adopted talent identification and detection models in attempts to enhance future performances. Talent identification and detection is associated with a plethora of assessments employed to determine which individuals have the potential to become talented athletes (Vaeyens *et al.*, 2008). The talent identification and detection process usually consists of numerous phases, accompanied with mass deselection upon each phase (Bailey & Collins, 2013; Vaeyens *et al.*, 2008). A number of faults have been reported with the traditional model of talent identification and detection (Bailey & Collins, 2013; Cumming *et al.*, 2017; Vaeyens *et al.*, 2008), in particular the lack of distinction between chronological and biological age. Biological age has been explored extensively, and methods to categorise individuals with non-

invasive measures such as peak height velocity, have since been recommended (Cumming *et al.*, 2017; Mirwald *et al.*, 2002).

Chronological versus biological age

Whilst chronological age looks at the length of time spent since birth, biological age looks at the age individuals enter puberty and develop through adolescence and into adulthood. Puberty is the process where the body undergoes hormonal and biological changes and it has been acknowledged that there is variability between timing and tempo between individuals (Cumming *et al.*, 2017; Mirwald *et al.*, 2002). In a sporting context, the most notable element of puberty is the ‘growth spurt’, which is a key indicator of essential biological developments at the point of peak height velocity (Cumming *et al.*, 2017; Mirwald *et al.*, 2002). The majority of individuals hit peak height velocity ‘on-time’, which for the average developing girl is 11.77 years, and for boys is 13.55 years (Mirwald *et al.*, 2002), whilst a minority will enter either earlier or later than the average. A reported example of a biological difference is of two individuals of the same chronological age with a biological difference of 2 years (Mirwald, 2002). There is also a high potential for far wider differences between individuals and this would not be an uncommon finding. This confirms that chronological and biological ages are neither synchronised nor uniform.

Biological bias

In a range of sports where size and strength are a particular premium (weightlifting, track and field, rugby, to list a few) it has been acknowledged that a bias may present itself, particularly benefitting those who are early biologically developed. Enhanced muscular and skeletal growth will undoubtedly result in superior performance to that of peers of similar chronological age, but with lesser biological developments (Philippaerts *et al.*, 2006). When considering those who are late-developers, they are not only at a disadvantage to individuals who are early- but also to the average-developed athlete (Cumming *et al.*, 2017).

If we refer to the practice of talent identification, specifically in the context of athlete detection, and consider that the process is usually a 1-day battery of tests on a large pool of athletes. Physical assessments directly associated to the given sport generally take precedence in initial stages, whilst skill assessments are usually reserved for later phases or are removed entirely. Over the course of a day, the athletes will perform these assessments, with progression to the next phase relying upon achieving a previously established threshold of metrics (Vaeyens *et al.*, 2008). Over the various phases (dependent upon sport or initiative), a small cohort of athletes who have achieved the highest standards of metrics within the threshold will likely be progressed into a period of talent confirmation (Vaeyens *et al.*, 2008). We can immediately identify that late-developing athletes will be at a distinct disadvantage to reach these desired metrics from the start, and will likely be deselected early due to being out-performed by those who are average- or early-developed (Cumming *et al.*, 2017; Philippaerts *et al.*, 2006). Furthermore, it can be estimated that those who are early-developed will likely have a stronger capability to attain these metrics, and have an increased selection potential to the average-developed athlete.

“Observations have been made that success in an early sporting career (i.e. elite youth status) will not always guarantee the continual success into senior levels. It is clear that the early biological advantage attained is short-lived when a level-playing field presents itself in the latter stages of adolescence and adulthood.”

Further issues

Observations have been made that success in an early sporting career (i.e. elite youth status) will not always guarantee the continual success into senior levels (Bailey & Collins, 2013; Vaeyens *et al.*, 2008). It is clear that the early biological advantage attained is short-lived when a level-playing field presents itself in the latter stages of adolescence and adulthood. Reports have been made of late developing individuals successfully attaining elite status in later life (Bailey & Collins, 2013). Furthermore, with a select few exceptions, it is well established that the practice of early specialisation is deemed inappropriate within the current model of talent identification and detection and the development of youths and has little advantage to that of early diversification (Bailey & Collins, 2013).

In addition to this, the non-inclusive nature to this method of selection may foster a potentially negative experience of sport that could increase the risk of dropout (Bailey & Collins, 2013). Repercussions could potentially result in athletes transferring to other sporting disciplines, or even a complete withdrawal from sport.

Practical recommendations

The recording of chronological age is still of importance. However, it is of equal, if not greater importance, to establish the biological age of an individual to allow fair comparison between athletes. Comparing individuals based on biological age removes the potential bias associated with early development. Methods have been researched that provide a significant prediction of biological age that are non-invasive to perform. These generally consist of anthropometric measurements, and in some instances, measurement of parental height (Cumming *et al.*, 2017; Mirwald *et al.*, 2002). These measurements are entered into a prediction equation that will provide various insights surrounding maturity status. Typical outcomes may predict years pre- or post-peak height velocity, or even predict adult stature. Caution must be used with such methods, as there has been various errors

highlighted that effect the accuracy of the predicted biological status. In particular, inaccurate anthropometric measurements will result in a magnified error of biological status estimation (Mirwald *et al.*, 2002). It may however be recommended to monitor the standing height of individuals on a monthly or bi-monthly basis, alongside the use of maturity prediction equations, to further inform decisions around the attainment of peak height velocity.

Research has looked at the use of grouping individuals based on biological age (termed bio-banding), suggesting a number of applications for its use, including that of talent identification and detection (Cumming *et al.*, 2017). Once biological age has been established within the talent identification and detection process, it allows for greater insights around individual performance outcomes from the associated assessments, and could equally determine talented athletes within late and average maturing individuals. It may even be postulated that the link of talent confirmation (a long-term period observing the performance developments of individuals) and biological age, may produce improved accuracy in the estimation of performance trajectory. However, for this to be correctly established and validated, more research is required within the field biological age, biobanding and talent identification and detection.

Summary

Talent identification and detection is commonly associated with a specific focus on chronological age. At present there is limited acknowledgement of the variations in biological age within talent identification and detection, a metric that would provide meaningful insight into performance selection. To address this variation of timing between individuals, biological age should be measured to allow for fair performance comparisons and projections. Various non-invasive tests have been recommended that utilise anthropometric measures and the monitoring of peak height velocity. It may also be suggested to regularly collect standing height profiles to monitor variations in growth, to supplement the use of these predictive tests. ■



Rich Kite

Rich is a Strength and Conditioning scientist in the field of talent identification. He works for British Weight Lifting and studies at University of East London. He is currently conducting research to explore methods accounting for biological age.

References:

- Bailey, R. & Collins, D. (2013).** The standard model of talent development and its discontents. *Kinesiology Review*, 2, 248-259.
- Cumming, S.P. *et al.* (2017).** Biobanding in sport: applications to competition, talent identification, and strength and conditioning of youth athletes. *Strength and Conditioning Journal*, 39, 34-47.
- Mirwald, R.L. *et al.* (2002).** An assessment of maturity from anthropometric measurements. *Medicine and Science in Sports and Exercise*, 34, 689-694.
- Philippaerts, R.M. *et al.* (2006).** The relationship between peak height velocity and physical performance in youth soccer players. *Journal of Sports Sciences*, 24, 221-230.
- Vaeyens, R. *et al.* (2008).** Talent identification and development programmes in sport. *Sports Medicine*, 38, 703-714.

Yorkshire and Humber Physical Activity Knowledge Exchange - advancing translational research in the North of England

Dr Kiara Lewis, Andy Daly-Smith and Nicola Corrigan provide an update on this new initiative.

The benefits of physical activity have been researched since the 1950s yet still the majority of the UK population fail to meet physical activity recommendations (BHF, 2017). Whilst systematic reviews of evidence attempt to assimilate and distribute the evidence to date, most policy makers do not believe that researchers fully consider the implications of their research from an applied perspective (Kite *et al.*, 2015). In addition, the media can distort research findings, leading to confusion over physical activity messages (Ding *et al.*, 2015).

In March 2016, the British Heart Foundation (BHF), supported by Public Health England, the National Centre for Sports and Exercise Medicine and the County Sports Partnership Network, held an event to bring together physical activity stakeholders from across Yorkshire and Humber. The aim of the event was to discuss the evaluation of physical activity programmes and how these could be scaled up to support the ambitions of Everybody Active Every Day (Public Health England, 2014). By bringing together a wide range of stakeholders it became increasingly evident that the links between research and practice could be considerably improved. From this, a network of interested individuals met to continue the progress made at the event. As a result, the Yorkshire and Humber Physical Activity Knowledge Exchange (YoHPAKE) was developed. It was officially launched on 25 January 2017 at a 1-day conference at Leeds Beckett University.

YoHPAKE provides a platform from which research can be shared, questions can be asked and answered, and relevant physical activity events can be listed.

Purpose: A regional network to bridge the gap between research and practice in physical activity and sport.

Vision: Yorkshire and Humber is a place where physical activity and sport practice is driven by research and research is driven by practice.

Aims: To facilitate strong collaboration across professional and organisational boundaries.

- Facilitating collaboration through local networks and partnership groups.
- Practitioners prioritising research needs to inform future studies.
- Collaboration between the academic sector
 - internal and external.

Membership

Members of YoHPAKE include researchers from a number of the region's Universities, as well as representatives from Public Health England, local authorities, County Sports Partnerships, Leisure Trusts, Sport England, the National Centre for Sport and Exercise Medicine, UK Active, the Youth Sport Trust, the wider education sector, clinical commissioning groups and GP clinical champions. Currently there are 228 individual members representing a cross section of over 40 stakeholders.

Achievements to date

At the launch conference in January 2017 over 40 delegates delivered oral and poster presentations sharing their projects from research and practice. There were five workshops delivered, which encompassed the developing portfolio of work within YoHPAKE.



Above: Dr Justin Varney, the National Lead for Adult Health and Wellbeing at Public Health England, delivered an inspirational and well received keynote lecture

These were:

- Exercise and chronic disease
- Community based physical activity
- Active schools
- Integrating physical activity into chronic disease pathways
- Physical activity in the early years.

Dr Justin Varney, the National Lead for Adult Health and Wellbeing at Public Health England, delivered an inspirational and well received keynote lecture entitled *Moving the nation: national evidence of action through local partnerships*. The day concluded with a keynote by Prof Jim McKenna entitled *Smart behaviour change; moving to attention-omics, habit cycles and over-determinism*. The evaluation suggested the event had been a great success with one delegate reporting, "It was very useful to gain an appreciation of the diversity of approaches from different stakeholders, and consider how to bridge existing gaps in interaction."

YoHPAKE now consists of the following:

- A virtual platform for the sharing of research and knowledge around physical activity.
- A membership platform to maintain accurate membership records.
- A virtual "ask YoHPAKE" platform where members can submit requests for support from other members.
- A schedule of physical events, with planning already underway for the second YoHPAKE conference to be held at Sheffield Hallam University in January 2018.

The work of YoHPAKE is already producing benefits for a variety of different members. The quotes below showcase how

the network is currently having an impact and how it may enhance future provision.

"From a County Sports Partnership and practitioner perspective the regional network supports us with the latest updates on physical activity research and also allows us to influence areas of research for the future."

James Brown,
Yorkshire Sport Foundation.

"I see YoHPAKE as a catalyst to improving research and evaluation across operational delivery that will help us to shape project design and influence policy development and funding for physical activity."

Sue Haigh,
Leeds City Council.

"Being able to connect with these people and organisations, work in partnership and find opportunities to 'scale up' will help Public Health England achieve its aim of improving health and well-being. YoHPAKE provides a platform for me to access the latest emerging evidence and identify and share promising local practice, which can be used to improve health outcomes across Yorkshire and Humber."

Gemma Mann,
Public Health England.

"I'm a Senior Manager in Public Health within the local authority. I am delighted to be a representative on YoHPAKE, it's a great opportunity to influence developments on a wider footprint and potentially have a bigger impact on the agenda. Whilst working in the North West I was an active member of the Physical Activity Forum and enjoyed sharing and encouraging good practice and innovation with colleagues across the locality. I feel YoHPAKE offers me the same opportunity here in Yorkshire and Humber. I have 27 years of knowledge and experience on the subject of physical activity and wish to share that insight and make a difference."

Alison Moore,
Bradford Metropolitan District Council.

"YoHPAKE has helped me to network and discuss physical activity with a range of experts in the area and keep up-to-date. The last conference was fantastic in keeping me up-to-date in a field I am hugely passionate about."

Dane Vishnubala,
GP and Y&H Physical Activity Clinical Champion Lead.

These quotes illustrate the breadth of partners within the network and show how collaboration between commissioners, providers and researchers is clearly appreciated. For academics it means we can make sure that we are researching the right questions and enhancing the 'impact' of our research through working with existing initiatives within the locality rather than creating and imposing our ideas on them. These are important factors, not only for making our research practically useful, but also for enhancing our Research Excellence Framework contributions, so increasing the esteem of our subject area and our institutions.

The future

A recent review of physical activity promotion (Pratt et al., 2015) suggested that successful interventions appear to evolve much more from community need and political will than from implementation of research findings. It is hoped that YoHPAKE will both encourage political will and help translate relevant research findings into practice. YoHPAKE events will explore ways in which a regional collaboration can add value to the provision of physical activity across Yorkshire and the Humber and establish the structures and resources needed for this to be successful. Ongoing

work will examine the current challenges of promoting physical activity within the region before looking more closely at the areas of existing good practice and what the group wants to achieve. Our aim is to mobilise the resources of academia to better promote physical activity, to address national and local agendas.

Following feedback from the conference the 'early year's workshop' members have started to create an early year's toolkit. This is a 'live' toolkit so will be updated as and when new information is released and when areas feel that have examples of good practice to share. The toolkit will have sections on:

- Guidance
- Assessing need
- The evidence base
- Local strategies and plans
- Interventions and local programmes
- Resources.

The second YoHPAKE conference is to be held at Sheffield Hallam University in January 2018, further information will be available through the YoHPAKE Google + forum. The opportunity to disseminate other existing events to members will allow for increased exposure and hopefully uptake of the many existing initiatives being run across the region. When marketing budgets are decreasing the opportunity to advertise, free of charge, across likeminded professionals is seen as one of the many positives of (free) membership to the network. YoHPAKE is about opening up lines of communications across the sector, working in combination to meet our joint objective to increase physical activity levels across Yorkshire and Humber. ■

The network is open to all. To register to become a member please use the QR code or this link: <https://tinyurl.com/yapxemmm2>



Dr Kiara Lewis

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Andy is a Senior Lecturer in physical activity and behavioural science at Leeds Beckett University and is a co-founder of YoHPAKE.



Nicola Corrigan

Nicola is a Health and Wellbeing Programme Manager with Public Health England Yorkshire and Humber Centre and is theme lead for healthy weight and physical activity. She is a co-founder of YoHPAKE.

References:

- BHF. (2017).** Physical inactivity and sedentary behaviour report. Available: www.bhf.org.uk/publications/statistics/physical-inactivity-report-2017.
- Ding, D. et al. (2015).** Vigorous physical activity and all-cause mortality: A story that got lost in translation. *Journal of Physical Activity and Health*, 12, 445-446.
- Kite, J. et al. (2015).** Assessing the usefulness of systematic reviews for policymakers in public health: A case study of overweight and obesity prevention interventions. *Preventative Medicine*, 81, 99-107.
- Public Health England. (2014).** Everybody active everyday An evidence based approach to physical activity. Available: www.gov.uk/government/uploads/system/uploads/attachment_data/file/374914/Framework_13.pdf
- Pratt, M. et al. (2015).** Can population levels of physical activity be increased? Global evidence and experience. *Progress in Cardiovascular Diseases*, 57(4), 356-367.

Optimising individual performance in cricket fast bowling

Dr Paul Felton, Kevin Shine and Dr Mark King present a forward dynamics solution to understanding the limiting factors on performance for an individual fast bowler.

In cricket, fast bowlers utilise the speed at which they deliver the ball in order to be successful. Although the fastest ball speed in history is recorded at 100 mph (160 km/h) only a handful of bowlers have achieved this feat, with the majority of elite bowlers operating between 80 and 90 mph (130-145 km/h).

Unfortunately, most scientific knowledge linking technique or strength parameters to fast bowling performance is derived from experimental research, where the results are not representative of the cause-and-effect relationships within an individual. For example, Worthington *et al.* (2013) found linear relationships in a group of elite fast bowlers, where the fastest had: quicker run-ups, straighter front knees at ball release, more trunk flexion and a larger delay in the circumduction of the bowling arm. It is doubtful, however, that within an individual these relationships are linear. For example, it is unlikely that continuing to increase run up speed will result in increased ball speeds. It is more likely that an optimal run up speed exists, either side of which performance decreases. Understanding which side of optimal an individual currently lies is difficult. As a result, coaching programmes are based on educated guesswork using knowledge of what 'the best' do, and not what the individual can do.

To address this problem a forward dynamics solution was developed in conjunction with the England and Wales Cricket Board (ECB). The aim was to understand the limiting factors on performance for an individual fast bowler and use this knowledge to directly influence their coaching.

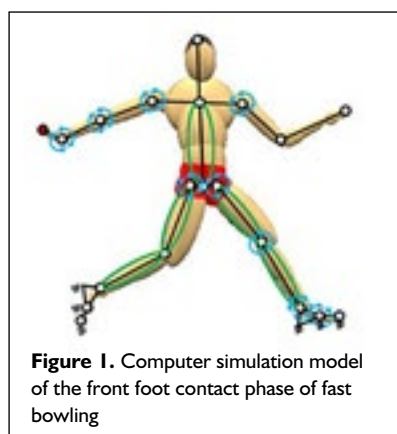


Figure 1. Computer simulation model of the front foot contact phase of fast bowling

The forward dynamics solution was a planar 16 segment torque-driven computer simulation model of the front foot contact (FFC) phase of fast bowling (see Figure 1). The simulation model was customised to an elite male fast bowler (age: 18 years, mass: 85 kg, height: 1.94 m), who was capable of bowling at 80 mph, by determining subject-

specific segmental inertia and strength parameters. The model was evaluated by minimising the kinematic and kinetic difference between simulation and recorded performance with an overall difference of 4%. The average difference of the kinematic components (joint angles, trunk orientation, centre of mass velocity and ball speed) was less than 1%, indicating that the simulation model could accurately reproduce the kinematics of the FFC phase of fast bowling, and was suitable to investigate the limiting factors of this individual's fast bowling performance.

Initially the simulation model was optimised to investigate whether technique was a limiting factor on performance by allowing the initial body configuration at FFC and the movement pattern from FFC until ball release to vary. The simulation model produced an optimal technique with a ball release speed of 97 mph. An increase of 22% (17 mph) compared to the recorded performance. This was achieved by delaying the extension of both shoulders at FFC, as well as having a straighter front leg with a larger delivery

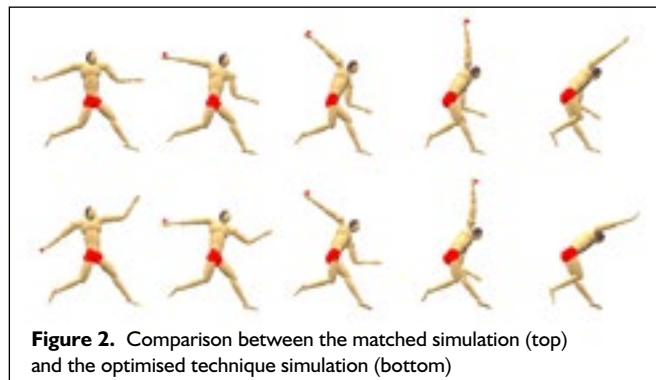


Figure 2. Comparison between the matched simulation (top) and the optimised technique simulation (bottom)

stride. This position allowed the front leg to stay straighter throughout and more trunk flexion to occur (see Figure 2).

To investigate whether strength was a limiting factor on performance, the isometric strength of the joints in the simulation model were increased by 5%. The model was optimised again allowing the initial body configuration and movement pattern to vary. The optimised result only found an increase in performance of 1% compared to the optimal technique optimisation.

These results indicate that this individual's recorded performance was limited by technique, rather than strength constraints. His coaching was therefore directed towards adapting his initial body configuration at FFC to have a straighter front leg and longer delivery stride, as well as delaying the extension of both shoulders. This has led to his ball release speeds increasing by 10% from 80 mph to 88 mph over the last 12 months as his technique gets closer to the predicted optimum. In the future, the aim is to use this forward dynamics solution to influence the coaching programmes of all bowlers in the ECB pathway.

Acknowledgements

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Kevin Shine

Kevin is the Lead Fast Bowling Coach for the England and Wales Cricket Board.



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Reference:

Worthington, P.J., King, M.A. & Ranson, C.A. (2013). Relationships between fast bowling technique and ball release speed in cricket. *Journal of Applied Biomechanics*, 29 (1), 78-84.



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Educating athletes on the power of food
Courtesy Jasmine Campbell

From the classroom to practice: the experiences of a sport and exercise science graduate to Sport and Exercise Nutrition registered Performance Nutritionist

Jasmine Campbell shares her experiences and provides advice for BASES student and graduate members interested in Performance Nutrition.

Academia to real-world sport science applications

Whilst completing my undergraduate degree (BSc Sport and Exercise Science) at the University of Worcester, one of my lecturers encouraged me to become a student member of BASES and embark on the BASES Supervised Experience (SE) pathway post-graduation. I attended a BASES workshop in my third year, granting me an invaluable insight into how the physiology team at the English Institute of Sport (EIS) were supporting their athletes. At the time, I certainly felt out of my depth, as it seemed that all the attendees worked in professional sports or were senior academics. This likely wasn't the case, as in further workshops I have attended there has been a broad range of individuals, with diverse reasons for their shared interest in the topic of the particular workshop. These workshops gave me the first real opportunity to be involved in applied sports science outside of my university studies, in addition to networking and learning about career pathways within the industry. I would strongly encourage all sport and exercise science undergraduate students to invest in themselves by attending conferences and events such as the BASES workshops. In hindsight, there has not been an occasion where I didn't leave an event feeling inspired and eager to put what I learned into practice.

I also attended the English Institute of Sport Skills4performance Physiology workshop in April 2014, which I highly recommend for those looking to work with athletes. Some of the benefits of the workshop include gaining an insight into the elite sport environment, developing competencies relevant to being a practitioner, and building a network of professionals to provide the best support for the athlete.

On completion of my undergraduate degree, I decided to enrol on the MSc in Applied Sport Science at the University of Gloucestershire. I enjoyed studying all disciplines of sport science and so decided to keep my options broad at this stage, rather than focus on one of the specialisms. I always favoured physiology,

however, and concentrated predominantly on this area throughout my 4 years of academic study. This early experience has helped me develop some of the soft skills I now have in my 'toolbox'. During the MSc programme, I also engaged in extra bits of work experience such as helping my supervisor, Prof Mark De Ste Croix, look at injury risk in female youth footballers (De Ste Croix, 2015). In addition, I was also fortunate enough to gain experience working in exercise physiology as a Laboratory Technician at Oxford Brookes University, further applying the specialist skills I had gained from my undergraduate and Master's degrees.

A word on BASES Supervised Experience

On finishing my Master's degree, I was making a means to an end with paid work that was not relevant to the industry alongside any work experience I could get my hands on. I began the BASES SE pathway, with my supervisor Dr Martyn Morris of Coventry University, which allowed me to focus on developing my competencies as a sport scientist. It felt rewarding completing my first portfolio submission, knowing that I had already made some good progress. The areas that require further development are identified and your reviewer and supervisor can help guide you in how to acquire them in work you are already doing, as well as looking for new learning opportunities.

Current issues with voluntary work experience within the sport science domain

One of the biggest problems I believe we currently face within the sport science industry is the lack of available work experience. On more than one occasion, I have found myself being turned down for work experience simply because there are too many applications per advertisement. It is an incredibly difficult interim stage where you have your academic qualifications under your belt and are very eager to begin shadowing an exercise physiologist or

“One way of gaining experience of how sports science practitioners work that I believe is invaluable, is to simply offer to take the person of interest for a coffee. During this informal conversation, you can learn so much from the practitioner about the reality of working in the elite sporting environment or as part of a sports science support team.”

sports nutritionist but for one reason or another, the opportunity just isn't available. One way of gaining experience of how sports science practitioners work that I believe is invaluable, is to simply offer to take the person of interest for a coffee. During this informal conversation, you can learn so much from the practitioner about the reality of working in the elite sporting environment or as part of a sports science support team. Often what you see posted on social media may only show you a very small glimpse of a much bigger reality, where the practitioner's working environment may be very different day-to-day. It is much easier to spare that half hour for a coffee, where you will most definitely learn something about their work and also develop a rapport with the person, than expecting them to provide you with a week packed full of work experience.

My experience of the applications of knowledge in a real-world setting through private practice

After seeing Laurent Bannock, of Guru Performance, tweet a picture of himself setting up his new private practice in Mayfair in 2014, I opportunistically decided to contact Laurent to introduce myself and offer my services in his new venture. Initial work experience progressed into a formal internship and then into paid work, where I shadowed Laurent's consultations and ran physiological assessments for his clients, such as basal metabolic rate measurements and lactate threshold tests. I was exposed to a wide range of clients, from recreational to elite athletes across a vast range of disciplines, where I was able to fully appreciate the overlap between exercise physiology and nutrition. Here I developed my interest in performance nutrition, and decided that was what I wanted to specialise in. Because my academic background was in Sports Science, opposed to Nutrition, Dietetics or Sports Nutrition, I completed the International Society of Sports Nutrition (ISSN) Diploma whilst working at Guru Performance. This was essential in enabling me to have eligibility to join the Sport and Exercise Nutrition register (SENr) as a graduate member and practise in my current role as a Performance Nutritionist.

A word on the SENr register

You can remain a Graduate member on the SENr register for up to 3 years. During this time, you will be building a portfolio and writing up a case study to demonstrate the compulsory competencies required for you to progress onto the Practitioner register, where you are deemed a competent and experienced Performance Nutritionist. I should point out for those who are trying to decide what pathway is best, it is not necessary to do both, but this is just how it worked out for me, where I wanted to keep opportunities in sports science open.

My current engagements

Unfortunately, as the Guru Performance business developed, my contracted work came to an end. Since leaving Guru Performance, I have been working for myself as a Performance Nutritionist with an expansive range of clients. I have been keen to say yes to every opportunity that has come my way, which has led me to working with Oxford United Football Club, British Orienteering, Oxford University Women's Lightweight Rowing Club and Saudi Arabia Men's Taekwondo team. In addition, I have some individual clients and

deliver a number of one-off talks and workshops for different sports clubs and related sporting events. Aside to my private Performance Nutrition work, I have also kept my hand in academia and have been doing some sessional lecturing at the University of Worcester and Oxford Brookes University. This includes teaching seminars, lectures and laboratory practicals to both BSc Sport Science and MSc Applied Sport and Exercise Nutrition programmes.

One of the aspects that I am passionate about in sport is the variety it brings; from the different cultures you get within each one, the differences between males, females and different age groups, those who have to work alongside full-time training or those who are full-time professional athletes, to working with an individual or a group of athletes. I enjoy developing a rapport with my clients and learning about their unique environment, so I can better understand how to engage them and be effective in my role, allowing me to make sure the athlete is at the centre of all my recommendations.

Some of the clients I work with have very limited resources, or perhaps there isn't a culture that believes nutrition is an important component of performance. This can be difficult, but those are the challenges that I enjoy and help me to develop as a practitioner the most.

To shed some light on the varying roles of a Performance Nutritionist, we:

- Expose and educate athletes on the power of food to support training, competition, recovery, illness, injury, etc.
- Safeguard athletes, parents and any support personnel by educating them in the risks of using supplements.
- If required, source safe supplements that are batch tested and registered on the Informed-Sport Programme.
- Work with managers, coaches and staff from a multidisciplinary team in how to support the athletes with their nutrition.
- Work with chefs, caterers and hotels to plan food logistics and menus.
- Create nutrition interventions to help an athlete reach a specific performance goal.

What I would deem to be beyond my scope of practice due to legislation/SENr Code of Conduct and so would need to refer a client on or terminate the working partnership:

- An individual who has a clinically diagnosed disease (i.e. type 2 diabetes mellitus, Crohn's disease, etc).
- An individual who is knowingly or ignorantly using a banned substance according to the World Anti-Doping Code (2015).
- Continue practising if I have not engaged in regular continued professional development (CPD).

At present, I am in a position where I can help others achieve their career aspirations that are in a similar position to the one I found myself in 2-3 years ago, as well as still looking to my more experienced peers for guidance. The value of building a network of fellow sport scientists (and Performance Nutritionists), gives me confidence in what I am doing. It allows for ideas, events and opportunities to be shared, which, combined with knowledge from my university studies, has helped inform the work I'm now doing. ■



Jasmine Campbell

Jasmine is a self-employed Performance Nutritionist and Exercise Physiologist who works with a wide array of different clientele and also guest lectures at Oxford Brookes University. She is a Sport and Exercise Nutrition registered (SENr) Performance Nutritionist and a BASES probationary sport and exercise scientist.

References:

- De Ste Croix, M. et al. (2015).** ACL injury risk in elite female youth soccer: Changes in neuromuscular control of the knee following soccer-specific fatigue. *Scandinavian Journal of Medicine and Science in Sports*, 25(5), e531-e538.
- World Anti-Doping Agency. (2015).** World Anti-Doping Code. Quebec, Canada. Available: www.wada-ama.org/sites/default/files/resources/files/wada-2015-world-anti-doping-code.pdf

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Final Word with Prof Brendan Cropley FBASES

One person who has inspired me

There are so many people that I could have mentioned here, particularly those who have had (and continue to have) a significant impact on my career, but the main person was a gentleman called Peter Grunnell, my Grandad. Put simply, he worked hard, never gave anything less than his best, and he loved life. As I wrote in the acknowledgements of my PhD thesis he was "The man who gave me the desire, determination, and values to succeed."

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

The applied practice literature in sport and exercise, whilst still in its infancy in some disciplines, is vital for the training and ongoing development of practitioners. My consultancy and teaching have certainly benefitted from the professional practice section of *The Sport Psychologist*. Linked to this, one book that I've read on a number of occasions that would be useful for all sport and exercise scientists is *Blink* by Malcolm Gladwell. The idea that the adaptive unconscious can be trained to enhance the intuitive judgements we make is fascinating and one that should be considered by those providing applied services. My apologies to Zoe Knowles, Dave Gilbourne and the late Lindsey Dugdill for not taking the chance to plug the reflective practice book that we co-edited here...looks like I owe Zoe another glass of wine!

One moment that changed the course of my career

A telephone call from Professor Sheldon Hanton offering me a fees-paid PhD studentship. I never had any intention of studying for a PhD and, at the time, had not long started the BASES Supervised Experience process. However, Sheldon managed to convince me that it was the right thing for me to do and so I jumped on board. The hard part was trying to convince my then fiancée (now wife) that another 3-4 years of study would be good for 'us' and then managing a full-time studentship with the equivalent of full-time employment. The 12 hour days, 7 days a week schedule certainly prepared me well for academia.

One great thing that sport and exercise science has achieved

Human performance wouldn't have progressed so quickly without the research and applied services offered by the sport and exercise sciences. We have generated knowledge through our research and practices that has helped to shape policy in performance and participation sport and exercise and this is something that we should celebrate.

One challenge that I think sport and exercise science faces

Management of the 'accredited practitioner' status to ensure that people working in applied sport and exercise science are suitably qualified and appropriately regulated. Unfortunately, there appears to be a whole host of consultants and small businesses who are unqualified and inappropriately label themselves.

One cultural reference

Talking to Harvard Seniors in the mid-70s, Muhammad Ali encouraged the graduating students to "go out and change the world and make it a better place." He ended his speech with a poem (the shortest in the English Language) that simply stated, "Me, we." The messages here regarding the importance of understanding and using our agency to positively shape our communities, and of togetherness and support are truly amazing.



Above: Brendan at the summit of Pen-y-Fan, the third and final mountain in the Welsh Three Peaks Challenge

One thing that made me want to be a sport and exercise scientist

Whilst I got close, I ultimately failed in the pursuit of my boyhood dream to be a professional football player. This was mainly because I was not ready (or able) mentally for that level of elite sport. Consequently, I wanted to study the psychology of performance, to research and examine it, and then ultimately use that knowledge to support others in the pursuit of their own sporting goals.

One thing that I like to do on days off

I love to play golf - well 'play' in the loosest sense of the word! Trying to reduce my handicap is currently my Everest but I'm certainly having fun exploring every inch of the course.

One bit of advice that really influenced me

When I began my Supervised Experience, my supervisor (in not so many words) advised, "Never take yourself too seriously. There's always someone doing something more important, so keep a sense of perspective and humility."

One thing I think the Government should implement immediately

A more formal policy regarding physical education in primary schools that: (a) builds physical education into the curriculum more formally to enhance the amount of children's physical activity throughout the school day; (b) focuses on the training and development of teachers to be able to engage children in appropriate physical activity; and (c) creates appropriate school environments in which children can be active.

One piece of advice for up and coming sport and exercise scientists

Be true to yourself. Understand who you are and where you've come from, what kind of practitioner you want to be and what your strengths are - and then make sure that you create opportunities to utilise these strengths on a regular basis. ■

Prof Brendan Cropley FBASES

Brendan is a Professor of Sport Coaching at the University of South Wales. He is a BASES accredited sport and exercise scientist and the co-editor of *Reflective Practice in the Sport and Exercise Sciences*.

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