The Inaugural Women in Sport & Exercise Conference: Blood, Sweat and Fears.

Staffordshire University, Stoke-on-Trent, UK. June 13th-14th 2018

Consensus Statement

Dr. Claire-Marie Roberts, University of the West of England, Bristol, UK, and Women in Sport & Exercise Academic Network (WiSEAN)

Dr. Jacky Forsyth, Staffordshire University, Stoke-on-Trent, UK, and Women in Sport & Exercise Academic Network (WiSEAN), main conference organizer

The inaugural women in sport and exercise conference was held at Staffordshire University on 13th-14th June, and brought together a number of academics, clinicians, practitioners, sport leaders, policymakers and administrators, charities, current and retired athletes, and the general public for a showcase of current research on female-specific health and medical issues and opportunities arising from women's participation in sport and exercise. Aside from these common themes, the conference sought to kickstart a redressing of the gender disparity of participants in sport and exercise science research. Courtesy of Costello, Bieuzen, and Bleakley (2014), we know that females are significantly under-represented in research across all the sports science and sports medicine disciplines. Ultimately, the result of this is the extrapolation of the findings, provided by male participants, to female athletes and exercisers (Costello et al., 2014). Contributors from a diverse range of disciplines such as physiology, biomechanics, psychology, nutrition, endocrinology, sociology, and sport policy sought to present their work from an academic, a professional practice, and a policy perspective. The commonality amongst all contributions was the consideration of females as a unique population both in research and in practice. Although the contributions were many and varied, there were a number of common themes that became apparent during the course of the two days; these were: encouraging more females into sport and exercise,

physical training and nutrition, menstruation, psychology, pregnancy, injury, ageing, and the lack of a level “playing field”.

Encouraging more females into sport and exercise

At the recreational end of the spectrum, there were sessions from sport policymakers and academics on the challenges associated with reducing dropout and making sport and exercise enjoyable for female adolescents, especially during puberty (Nicholson, 2018), and for female University students (Carter, 2018). Furthermore, research from Burbage and Brown (2018) highlighted the importance of concerns about breasts as a barrier to exercise and the stereotyping of role models who “look too fit” to inspire the average female (Nicholson, 2018). In amongst the contributions aimed at increasing female participation was a lively keynote from Lisa O’Keefe who presented the unrivalled success of Sport England’s #LikeAGirl campaign that has inspired an additional 2.6 million girls to engage in sport and exercise (O’Keefe, 2018). There were many successful interventions discussed that can all be translated into practice to help increase the growing trend in sport and exercise participation in this population.

Physical training and nutrition

The sex differences in physiology between men and women are often the starkest when you think about sport and exercise. Yet, from the research presented, it became clear that important physiological factors are rarely considered when designing suitable nutrition and physical training advice for the female athlete or exerciser. For example, we learned that females oxidize more lipids than do men during submaximal exercise (Stevenson, 2018), which will clearly demand a different nutritional intake for effective performance. Likewise, females using oral contraceptives may be at a greater risk of muscle damage during exercise, and the use of hormonal contraceptives generally may have implications for health

and athletic performance, as they alter the concentrations of ovarian hormone exposure (Elliott-Sale, 2018). All these issues are important considerations in the effective support of female athletes and exercisers.

Menstruation

There were several presentations that featured the negative impact of menstrual dysfunction on sport and exercise performance. Ultimately, researchers suggest that it is important to have a regular menstrual cycle as an elite athlete (Dooley, 2018; Keay, 2018), and that instances of heavy menstrual bleeding (resulting in iron deficiency) should not be overlooked (Bruinvels, 2018). Yet, Relative Energy Deficiency in Sport (RED-S), otherwise known as the Female Athlete Triad, can impair physiological function such as menstrual function, bone health, immunity, protein synthesis, and cardiovascular health (De Souza, Koltun, Southmayd, & Aurigemma, 2018). The first symptom of RED-S or the Female Athlete Triad is often amenorrhea – the absence of a normal menstrual period. It was disappointing to learn that some athletes had been advised by their general practitioners (physicians) that an absence of periods was “normal” in female sport. In some cases, they were prescribed an oral contraceptive as a “solution”. The conference contributors were clear that all cases of amenorrhea should be investigated due to its short- and long-term health consequences such as a reduction in vasodilatory capacity (Birch, 2018), and the detrimental consequences it has on bone (Hind, 2018). Indeed, contributors warned against the use of oral contraceptives to “treat” amenorrhea as this approach induces an “imposter period” which is no substitute for a menstrual cycle with fluctuating hormones (Elliott-Sale, 2018).

Psychology

It is clear that sociocultural and socio-cognitive influences determine nuanced behavior in athletes and exercisers (Roberts, Ferguson, & Mosewich, 2018), and, therefore, there are

many psychological components of performance that may differ according to gender. For example, during sport competition, research suggests that females often adopt different pacing and tactical strategies than males, which are often more robust and independent of opponents (Hettinga, 2018) – information that is key to effective coaching and performance psychology support. In addition, the unique quandary of female athletes who decide to become a mother *during* an athletic career creates a significant interruption to their career trajectory, bringing with it a unique set of demands that requires coping processes to allow a return to elite sport. This level of disruption, Roberts and Kenttä (2018) argue, means that motherhood during an athletic career should be treated as a career transition within its own right (Roberts & Kenttä, 2018). The nuances of this situation require greater awareness and support strategies on the part of athlete support personnel and the sports concerned. Women can also develop their own confidence to face challenging situations through their athletic and exercise careers (Jones, 2018).

Pregnancy

For exercisers and elite athletes alike, contributors to the conference repeatedly called for clinicians and practitioners to upskill themselves to ensure they are competent enough to encourage and support women wanting to exercise and train during pregnancy (Hind, 2018), especially with the encouraging evidence that exercise can help prevent antenatal and postnatal (postpartum) depression and weight gain (Daley, 2018). In addition to this, it was clear that there is an urgent need for the design and implementation of return-to-play strategies for women after childbirth (Elliott-Sale, 2018; Roberts & Kenttä, 2018, Smith, 2018), no matter what level at which these women exercise or compete.

Injury

Conference contributions emphasized the role of hormonal fluctuations during the menstrual cycle in putting females at greater risk of sport injury than males. Important work that was discussed involved screening athletes and providing bespoke training to counteract injury susceptibility (De Ste Croix, 2018). Additionally, Duffy (2018) spoke about the identification of the higher frequency of concussion in female athletes, and the process she is embarking on to attempt to understand why this is the case.

Ageing

Advantageously for females, research presented at the conference identified the vast benefits of a lifetime of exposure to estrogen (Birch, 2018). Not only is estrogen cardioprotective, but it is also important for bone health for the exercising female (Babatunde & Forsyth, 2013), and can reduce triglycerides and insulin sensitivity. However, Birch (2018) suggested that, as we get older, the number of our estrogen receptors decrease, thereby heightening the risk of cardiovascular disease and increasing our likelihood of mortality. The research that Birch (2018) presented suggested that high-intensity interval training has been shown to moderate the risk of coronary heart disease in later life, providing clear direction on successful interventions for older adult females.

Sport is not a level playing field

Although the numbers of female athletes and exercisers is on the increase, there remains a great gender disparity in sport, specifically in the leadership and coaching domains. From a leadership perspective, Phelps (2018), in her talk entitled “The problem with women’s sport” encouraged us all to challenge the status quo by observing that we cannot expect half the population to work to norms developed 100 years ago. On the same theme of gender disparity in sport, Norman (2018) discussed her work that has highlighted the acute difference between the numbers of men and women coaches and at a leadership level in

sport (Norman, 2018). She went on to suggest that gender-inequitable organizations produce gender-inequitable results and encouraged us all to take an active role in influencing the culture of sport, such that it becomes a female-friendly environment for gender diversity.

Summary

This statement merely provides an overview of some of the key themes evident in the conference contributions. There were many more talks and presentations that provided us with an insight of the female-specific nuances of sport and exercise, including many excellent studies that addressed important topics such as using exercise to decrease hot flushes in breast cancer patients (France, Brislane, Holcome, Low, & Jones, 2018), homophobia in female team sport (Bullingham & Roberts, 2018), and how to leverage charity challenges (e.g., race for life) as a gateway to more regular exercise (McVinnie, Plateau, & Stevinson, 2018). Extended abstracts, providing a greater level of detail, are featured in this issue of *Women in Sport and Physical Activity Journal*.

Next steps

The consensus arising from the conference on the next steps for continued progress in the area of women in sport and exercise are summarized as follows:

- Research in the women in sport and exercise domain is in its relative infancy. Much more work is required to ensure that the field produces findings from studies that are truly representative of the population to which they are being applied.
- Males and females should participate in the same research projects, with equality of representation to determine true gender differences.

- Although hormonal fluctuations and other confounds, such as the use of hormonal contraception, makes research with female athletes and exercisers challenging, future research should be designed to take these challenges into account.

Finally…

The conference featured many members of the growing Women in Sport and Exercise Academic Network (WiSEAN). We are fortunate to have members representing a number of disciplines, from all around the world who are working together to grow, strengthen and promote research in women and sport and exercise. If you would like to join our dynamic network, please email Dr. Claire-Marie Roberts (claire-marie.roberts@uwe.ac.uk) or Dr. Jacky Forsyth (j.j.forsyth@staffs.ac.uk) expressing your interest. For 2019, the Women in Sport and Exercise/WiSEAN conference will be hosted at St Mary's University, Twickenham, London, UK on June 11th and 12th.

References

Babatunde, O., & Forsyth, J. (2013). Effects of lifestyle exercise on premenopausal bone health: a randomised controlled trial. *Journal of Bone and Mineral Metabolism*, *32*(5), 563–572. https://doi.org/10.1007/s00774-013-0527-9

Birch, K. (2018, June). *Female hormones, exercise and cardiovascular health*. The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Bruinvels, G. (2018). *The menstrual cycle, iron deficiency and exercise.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Bullingham, R., & Roberts, C. (2018). Examining homophobia in female elite team sports. *The Inaugural Women in Sport & Exercise Conference*, Staffordshire University, Stoke-on-Trent, UK.

Burbage, J., & Brown, N. (2018). *Breast biomechanics: Performance and health implications.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Carter, A. (2018). *"Throw Like A Girl" Female student athletes: an exercise in self-esteem and self-worth.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Costello, J. T., Bieuzen, F., & Bleakley, C. M. (2014). Where are all the female participants in Sports and Exercise Medicine research? *European Journal of Sport Science, 14*, 847-51. https://doi.org/10.1080/17461391.2014.911354

Daley, A. (2018). *Lifestyle interventions for women's health issues.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

De Souza, M. J., Koltun, K. J., Southmayd, E., & Aurigemma, N. (2018). The female athlete triad. In J. J. Forsyth & C.-M. Roberts (Eds.). *The exercising female: Science and its application.* Routledge: Oxford.

De Ste Croix, M. (2018). *High Risk, High Reward: The efficacy of injury prevention training is greater in high risk compared to low risk elite female youth soccer players.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Dooley, M. (2018). *To bleed or not to bleed: the benefits and risks of menstruation and sport.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Duffy, D. (2018). *Concussion and the female athlete.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Elliott-Sale, K. (2018). *Coping with the menstrual cycle and hormonal contraceptives (i.e., how they affect health and performance).* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

France, M., Brislane, A., Holcome, C., Low, D., & Jones, H. (2018). *Can exercise training improve the frequency and severity of hot flushes in breast cancer patients taking aromatase inhibitors?* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Hettinga, F. (2018). *Differences between males and females in pacing and tactical decision-making.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Hind, K. (2018). *Bone health and the female athlete.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Jones, J. (2018). *A performance psychology approach to building confidence.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Keay, N. (2018). *Female sports endocrinology.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

McVinnie, A., Plateau, C., & Stevinson, C. (2018). *A qualitative study exploring active charity events as a catalyst for sustained physical activity behavior.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Norman, L. J. (2018*). Coaching, diversity, women in sport and coaching.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Nicholson, K. (2018). *Exploring the impact of puberty on girls' attitudes and behaviour towards sport.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

O'Keefe, L. (2018). *Sharing the story behind This Girl Can campaign.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Phelps, A. (2018). *The problem with women's sport.* The Inaugural Women in Sport & Exercise Conference, Stoke-on-Trent, Staffordshire.

Roberts, C.-M., Ferguson, L., & Mosewich, A. (2018). *The psychology of female sport performance.* In J. J. Forsyth & C.-M. Roberts (Eds.) *The exercising female: Science and its application.* Routledge: Oxford.

Roberts, C., & Kenttä, G. (2018). *Motherhood as an athletic career transition in female Olympic athletes.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Smith, R. (2018). *Research & design of the CMOs infographic. 'Physical Activity for Pregnant Women'.* The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Stevenson, E. (2018). *The need (or not) for female-specific sports nutrition*. The Inaugural Women in Sport & Exercise Conference, Staffordshire University, Stoke-on-Trent, UK.

Day one: Speakers and abstracts

Keynote speaker: Angela Smith

Former Squash Professional; Chair of Supporters Council, Stoke City FC ambassador with responsibility for projects in Far East; International Sports Consultant, Beswicks Sports, Stoke-on-Trent, England, UK

The difficulties and frustrations encountered as a professional sportswoman and overcoming them

Angela discussed her career as a professional squash player, and the difficulties in starting a professional circuit for women players. She also talked about the advantages that being successful can bring during and after a career in sport and the twists and turns on that journey. In short, she says: always pack a sledge hammer because some walls may need to be knocked down in your efforts to achieve your ultimate goal and be prepared to shed bucketsful of sweat and maybe more along the way! In her presentation, she suggested that to be successful, particularly in sport as a female, you need to be phenomenal or be forgotten, and that once you feel you are the finished article, then you are finished. If you do not see yourself as a winner, then you can't perform as a winner. The preparation, the sacrifice, the constant desire to improve were all covered in her presentation, which highlighted that sports are really a microcosm of society.

Invited speakers

Dr. Emma Stevenson

Professor of Sport and Exercise Science, Human Nutrition Research Centre, Faculty of Medical Sciences, Newcastle University, UK

The need (or not) for female-specific sports nutrition

The sports nutrition industry is growing on an annual rate and although still limited, there has been an increase in female-specific sports nutrition products appearing on the market. There is still a debate in the academic literature whether the metabolic responses to exercise significantly differ between males and females; however, females are still significantly under-represented in sport and exercise science research. Recent data suggest that fewer than 40% of participants in the available literature are female. Studies using female participants often fail to fully consider hormonal fluctuations throughout the menstrual cycle and there are large variations in contraceptive use that impact ovarian hormone cycles. Other confounding factors such as nutritional status, fitness level, and type and intensity of exercise also need to be accounted for in study designs. Although there are subtle differences in substrate metabolism both during and after steady-state exercise at a given exercise intensity between men and women, it is still debated whether this warrants different nutritional guidelines for male and female athletes. At present, there is little evidence to suggest that female-specific protein or carbohydrate requirements are necessary but that intakes of these macronutrients should be relative to the individuals' body mass and training status. Micronutrient intake of active women can be low if energy intake is restricted, food groups are eliminated, or if a special diet is followed. It is recommended that nutritional strategies should be tailored to the individual's body mass and composition, type, frequency duration, and intensity of exercise

training, and overall training goals. Contraceptive use should also be taken into consideration when planning nutritional strategies.

Dr. Kirsty Elliott-Sale

Senior Lecturer and Member of the Musculoskeletal Physiology Research Group, Sport Health and Performance Enhancement (SHAPE) Research Centre, School of Science and Technology, Nottingham Trent University, UK

Coping with the menstrual cycle and hormonal contraceptives

Female reproductive hormones change throughout the menstrual cycle and as a result of hormonal contraceptive use. There is large inter- and intra-individual variation in endogenous estrogen and progesterone concentrations both within and between menstrual cycles. Due to the variety of brands, types, and delivery methods of hormonal contraceptives available, there are large differences in the chemical constitution of hormonal contraceptives and concomitant physiological effects. The metabolic and performance-based effects of the menstrual cycle and hormonal contraceptives are poorly understood. This presentation aimed to discuss the proposed effects of the menstrual cycle and hormonal contraceptive use on athletic performance and female health. The endocrinology of the menstrual cycle and hormonal contraceptives was presented, alongside studies using these hormonal profiles to investigate performance in female athletes. The research is currently unclear and undecided on the direction or magnitude of effects of the menstrual cycle and hormonal contraceptive use on female athletic performance. Additional, high quality, well-controlled studies are needed in this area.

Dr. Florentina Hettinga (PhD, SFHEA, FECSS)

Senior Lecturer, School of Sport, Rehabilitation and Exercise Science, University of Essex, UK

Pacing, fatigue and tactics of winning races: Are there differences between men and women?

Many studies have researched how athletes regulate their exercise intensities and how athletes behave and perform in competition. After an initial focus on the exploration of pacing strategies in time-trial exercise, more recently tactics and decision-making processes in head-to-head competition have been explored. A framework was presented that provides an alternative way of understanding decision making regarding the regulation of exercise intensity in social contexts. Decision making and the modification of ongoing behavior can only be properly understood in the context of the simultaneous availability of multiple affordances (related to opponents, fatigue, positioning, etc.) and the competition between them (Hettinga, Konings, & Pepping, 2017). When racing an opponent, for example, athletes perform better and pace their races differently compared to when racing alone (Konings, Schoenmakers, Walker, & Hettinga, 2016a). However, mostly male athletes have been studied. Though most studies focused on male athletes only, several recent studies took differences in pacing patterns, fatigue development, and tactics between men and women into account. For example, long-distance events (half-marathon and also longer events) show women to have a more stable and even-paced pattern compared to men (Hanley, 2016); this is potentially related to differences in decision-making, over-confidence, physiology (fat versus carbohydrate usage), and sex differences in fatigability. Also, in shorter 1000-m and 1500-m short track skating competitions, a more even-paced pattern for women was found (Konings, Noorbergen, Parry, & Hettinga, 2016b). Though several studies started exploring pacing and tactics in women, more research is needed, focusing on women specifically.

Dr. Sarah Grogan

Professor of Psychology, Health & Wellbeing, Manchester Metropolitan University, UK

Body image and exercise: How might appearance concerns prevent (or promote) exercise in young women

Researchers tend to find more positive body image in women who exercise than those who do not, and experimental studies show that women randomly allocated to exercise conditions report more positive body image post-intervention compared to controls. This finding has led researchers to conclude that exercise improves women's body image, probably through increasing women's focus on body function, fitness, and performance rather than body aesthetics. Although exercise has been linked with positive body image, this does not mean that women who engage in sport and exercise do not have body image concerns. Pressure likely comes from two sources for women who exercise: broad socio-cultural pressure to be thin, and sport-related pressure which may be particularly acute in sports where low body fat levels might confer a competitive advantage. Weigh-ins and focus on diet and weight loss, and requirements to wear revealing sport uniforms, can lead to significant pressures to be lean, which can also lead to body dissatisfaction, disordered eating, and over-exercise to reduce weight. Although exercise can improve body image, some women may also avoid exercise because of body concerns and may make unhelpful social comparisons with the bodies of other women when in exercise settings which can exacerbate body dissatisfaction. The aim of this talk was to consider the complex links between exercise and body image in promoting and preventing women from engaging in exercise. Examples of how to improve body image that are relevant to women who exercise were to be considered. These included focusing on health and nutritional needs rather than body weight, normalizing healthy eating, encouraging women to avoid making comparisons between their own bodies and those of other women, encouraging more realistic and healthy

ideals, refocusing on performance and body function rather than appearance, and promoting body acceptance rather than body critique.

Dr. Jenny Burbage

Principal Lecturer and Researcher in Biomechanics, Department of Sport & Exercise Science, University of Portsmouth, UK

Dr. Nicola Brown

Senior lecturer and researcher, School of Sport Health and Applied Science, St Mary's University, UK

Breast biomechanics: Performance and health implications

Independent breast movement occurs during exercise due to limited intrinsic breast support. This lack of support can have a number of negative consequences for both elite sports women and recreationally active females. These consequences include: exercise-related breast pain, reported in up to 72% of exercising females; potential breast damage; an effect on sports performance; and psychological effects, such as embarrassment, which can deter females from participating in exercise. It is important to research breast biomechanics to: understand the fundamental biomechanics behind breast motion; understand factors relating to breast pain and damage; inform breast support requirements; and to identify performance factors related to breast support in female athletes. This session provided an overview of our Research Group in Breast Health's novel research findings investigating the effects of breast support on ground reaction forces, gait kinematics, physiological parameters, muscle activity, and perceptions of comfort and pain. It also explored the benefits of breast health education in improving knowledge and awareness of appropriate breast support and bra fit to allow women to exercise safely and in comfort throughout their lives. Our research has identified that sports bra use, and knowledge of breast health in adult women is low. Bra fit issues are also common and more problematic for larger-breasted women, demonstrating the need for breast education. Breasts are the first manifestation of puberty for approximately 85% of girls

and it is reported that girls drop out of sport around the time of puberty. We surveyed over 2000 adolescent girls and 46% reported that their breasts had some effect on their exercise participation. Additionally, half of girls reported never wearing a sports bra during exercise. Breast education is key to improving knowledge and awareness of breast support and bra fit, and 87% of girls reported that they wanted to receive breast education.

Dr. Donna Duffy

Programme Director, Center for Women's Health and Wellness, Assistant Professor, and Co-Director of the Female BRAIN Project, Department of Kinesiology at UNC Greensboro, NC, USA

Concussion and the female athlete

The rate of concussions for female athletes per athletic exposure is often equal to and sometimes exceeds that of male athletes, depending on the sport (Zuckerman et al., 2015). However, the majority of concussion research to date has only included male athletes or a combined male/female athlete population. Although female concussion rates meet or exceed those of males, there is not a critical mass of research focusing on female athletes. This is a clear disparity in research and a gap that needs to be addressed, because head trauma does not lead to a homogeneous outcome between the sexes (Covassin, Swanik, & Sachs, 2003; Dick, 2009). Therefore, we cannot simply use what we have learned from male athletes and apply it to female athletes in all cases (Covassin, Elbin, Crutcher, & Burkhart, 2013) in terms of rehabilitation and recovery. This presentation focused on the research efforts and possible clinical implications of the Female BRAIN Project at UNC Greensboro, in North Carolina, USA

Kate Nicholson

Head of Insight and Innovation, Women in Sport, UK

Exploring the impact of puberty on girls' attitudes and behavior towards sport

Embedding positive exercise habits during teenage years supports activity levels later in life. Attitudes and behaviors formed during the pubescent years are, therefore, critical. This qualitative research was designed to discover how to help prevent girls from disengaging with sport during their transition to adulthood.

Around puberty, there is a significant drop off for girls in physical activity levels and positive attitudes towards sport. This is underpinned by deepening issues relating to low confidence, body image, and self-esteem, making girls feel especially judged on both appearance and ability during sport. We observed that even previously active girls lose enthusiasm during this time. Menstruation is also a major reason to avoid taking part in exercise. All of this can have a lasting impact on both engagement and enjoyment and, in certain cases, can be a cause for stopping physical activity altogether.

To build resilience and support girls we must consider how to

- minimize anxiety when coming to terms with girls' changing body;
- empower girls to take control of their health and wellbeing, make their own decisions, and support their confidence and self-esteem;
- make playing sport for fun more acceptable and make more opportunities available; and
- ensure sport aligns with their new adult identity and growing independence.

Andrea Carter

Assistant Dean Student Wellness, Support & Success in the Office of the Dean of Students at the University of Toronto Mississauga, Mississauga, ON, Canada, and Associate Professor at the University of Western Ontario, ON, Canada

"Throw Like A Girl" Female student athletes: An exercise in self-esteem and self-worth

Erwin Stauss described the difference between females and males while throwing a ball for sport (Young, 1980, p. 137). He observed and commented that "a boy of the same age, when preparing to throw, stretches his right arm sideward and backward… he can support his throwing almost the full strength of his momentum". He concluded that "the girls should be expected to compensate for such a relative weakness, that the difference in style is the feminine attitude in relation to the world and space". While his work was challenged by writers from a feminist lens, his observation of social engagement of the female athlete cannot be missed. The discourse on what it means to be a female athlete, has limited *who* can be a female athlete, has limited the perception of females and their ability in sport/recreation; there is pressure to conform to a particular model. How women use their bodies and how they are taught to use their bodies impact the perception of sport and recreation. At our university, we struggled with the perception of what it means to be a female athlete – the view that this was negative and not positive – that the male athletes mattered but not the female athletes. Our discourse needed to be challenged. The men's basketball team is not without an audience and community engagement when playing a home game, whereas the female basketball team rarely fills one portion of the stands. This simple observation, which is true across many professional sporting events, led to the uncovering of possible barriers to equity in sport. The research indicated that participation in sports could lead to a decrease in physical self-esteem, particularly if females used male performance as a comparator. When females compare themselves, they feel less capable

and assume that they are not as strong as most around them. The notion of not wanting to throw like a girl is very real. While our drop-in programs (yoga, barre, spinning) held an audience, our attempts at sport recruitment continued to decline. There have been some influences in sport recruitment to address these issues in North America – mainly the creation of legislation for gender equality. An honest view of our department showed that male sporting events received consistent coverage on social media outlets, the coaches were paid more, the team players were recognized outside of the sporting arena, and their uniforms were nicer. Our women's events were not promoted as broadly, the audience size for spectators was dramatically smaller, and the confidence of our athletes was markedly different. Our next steps include equality in pay for coaches, resources to assist athletes specifically building resiliency and self-esteem, social media campaigns, and uniforms and gear reflective of the athletes' needs. Figures 1 to 5 are images of our social media focused on female athletes, which we are currently using in our media (print and social) outreach efforts.

<INSERT FIGURE 1 HERE>

<INSERT FIGURE 2 HERE>

<INSERT FIGURE 3 HERE>

<INSERT FIGURE 4 HERE>

<INSERT FIGURE 5 HERE>

Day two: Speakers, biographies, and abstracts

KEYNOTE SPEAKER: Annamarie Phelps CBE OLY

Vice Chair, British Olympic Association, Great Britain

A personal potted history of the changing face of the "problem of women's sport" from school sport through to Chairman of British Rowing

Despite numerous programs to support women who want to progress in the sporting and corporate world, and there has been progress, there is a general acceptance that neither the status quo, nor the speed of change, is good enough. Why is it so difficult for women to be accepted as an integral part of the sporting sector? Most of our sport structures, rules, and codification were devised in the 19th century, at about the same time as Pierre de Coubertin was establishing the Modern Olympics. So much of our modern-day sporting terminology and behaviors come from the military at that time. Sport celebrates the "fastest, highest, strongest", leaving females at a natural disadvantage. I would suggest that these simple qualitative measures are too simplistic for the complex and diverse society we live in today. The answer is not to merely drop in women who have developed the skills to fit into the male-centric model of sports governance – we need to re-shape the sports landscape and redefine what a sports leader for the future looks like.

INVITED SPEAKERS

Lisa O'Keefe

Insight Director at Sport England, UK

A presentation about the ground-breaking campaign This Girl Can

Sport England's This Girl Can campaign successfully balanced rigorous research and bold creative interpretation to create an exciting campaign that genuinely resonates with the target audience. This presentation

- introduced the problem we were trying to fix;
- showed cutting-edge insight behind the campaign;
- illustrated how our insight shaped the campaign at every step of the way;
- demonstrated how successful the campaign has been; and
- shared what we are learning about activating the This Girl Can experience through our This Girl Can Swim pilot which has transformed the swimming pool experience for its target audience.

Dr. Karen Birch

Professor and Head of School, Biomedical Sciences, University of Leeds, UK

Female hormones, exercise and cardiovascular health

Estrogen exerts protective effects upon the cardiovascular system in premenopausal women, resulting in lower rates of cardiovascular disease (CVD) in females versus males. Cardioprotective effects of estrogen are mediated by estrogen receptors present throughout vascular and cardiac tissue. At menopause, estrogen and its protective effects are lost resulting in a steeper decline in cardiovascular health than in age-matched males. Indeed, traditional CVD risk factors appear to have a more profound effect in postmenopausal women. Loss of estrogen directly affects the structure and function of the vasculature and the heart. This talk assessed the interaction between estrogen, cardiovascular health, and exercise.

Dr. Amanda Daley

Professor of Behavioural Medicine, School of Sport, Exercise and Health Sciences, Loughborough University, UK

Lifestyle interventions for women's health issues

This lecture provided a life-course perspective on the effects of lifestyle interventions on outcomes relevant to women's health, particularly during pregnancy and the postnatal period. The focus was on outcomes such as excessive gestational weight gain, postnatal weight loss, and antenatal and postnatal depression. The lecture also discussed the potential benefits of exercise for menstrual disorders. The focus was on presenting evidence from systematic reviews of randomized controlled trials related to the aims of the lecture. There is limited evidence that lifestyle interventions can prevent excessive gestational weight gain, and regular weighing during pregnancy is ineffective. Current reviews indicate that interventions can be effective in helping women to lose weight after having baby, but these interventions have tended to be very intensive, which are not likely to be affordable to healthcare services. Reviews have consistently indicated that exercise can significantly reduce antenatal and postnatal (postpartum) depression, but study quality to date has been mixed. Evidence also shows that exercise interventions can reduce primary dysmenorrhea (menstrual pain), but there is substantial heterogeneity in the evidence and trial quality has been variable. Lifestyle interventions are important in improving women's health but better-quality trials with long-term follow up would be useful. Interventions that can be easily embedded into existing healthcare services are required to ensure they are affordable. Further evidence regarding interventions to manage excessive weight gain is required as current interventions have been largely ineffective. Exercise should be promoted with women to prevent and treat antenatal and postnatal depression, as well as for menstrual disorders such as primary dysmenorrhea.

Dr. Karen Hind PhD, CCD

Assistance Professor, Department of Sport and Exercise Sciences, Durham University, UK, and Honorary Visiting Fellow at the Institute of Cellular Medicine, University of Newcastle upon Tyne, UK

Bone health and the female athlete

The risk for diminished bone strength in female athletes with absent or irregular menses has been recognized for over 30 years. The aim of this session was to explore advancements in our understanding of bone health and the female athlete over the last three decades, from the identification of the Female Athlete Triad and the negative effects of relative energy deficit, to what this means for injury risk and long-term health, and to the current knowledge base on management and treatment. Female athletes in weight-bearing or bone strain-inducing sports have 5% to 20% greater bone strength than their non-exercising counterparts. Bone strength deficits have been reported in female athletes specializing in weight-assisted sports such as cycling or swimming. Energy deficit and menstrual dysfunction can further negate bone strength in female athletes and should be corrected in a timely manner to prevent bone loss and bone stress injuries. Bone deficits may be recoverable at least until the end of the third decade, but there is little or weak evidence to support the use of the oral contraceptive pill or pharmaceutical agents for treating low bone density in female athletes. Rather, increasing energy availability and weight gain are more effective strategies, with bone strength improvements reported over one to six years. There is scant evidence on the long-term bone health in female athletes with previous energy deficit and menstrual dysfunction. Research over the last three decades has advanced our understanding of female athlete bone health. Future research should explore whether or not exercise-related skeletal benefits or compromises continue into later adulthood and what impact this has on fragility fracture risk with age.

Dr. Leanne Norman

Reader, Carnegie School of Sport, Leeds Beckett University, UK

Presenting a programme of research towards improving gender diversity in the UK coaching profession

Sport and gender literature includes numerous examples of studies and writing around the issue of women's under-representation as coaches. The consensus is that, globally, the coaching profession has long been, and continues to be, a white, male-dominated occupation. The issue of an imbalanced profession continues to persist despite an improvement in wider social attitudes and legislation towards equality and diversity within Western societies, as well as the actions of sporting organizations and national governing bodies. A different 'lens' is required on the issue of the lack of diversity within the coaching workforces. This presentation conceived gender diversity within a wider vision of organizational success or performance. Existing research has provided us with burgeoning knowledge of this subject area. Therefore, this talk explored, with delegates, new ideas and directions for research and action to recruit and nurture a more gender-balanced coaching profession through an organizational cultural lens. Tenets of organizational culture were discussed in order to understand what the crucial factors are in facilitating the recruitment, retention, and progression of a more gender-diverse coaching workforce. The talk identified the need to move away from "fix the women" and "equal opportunities" narratives within sport to tackle what are some of the underlying cultural issues as to why there are a lack of women in our coaching and leadership bodies. The presentation identified disparities between espoused values and assumptions within governing bodies in order to enact cultural change towards supporting more women to be valued, included, and progressed in the sporting workplace.

Dr. Nicola Keay BA, MA (Cantab), MB, BChir, MRCP

Nicky Keay Fitness, UK

Female sports endocrinology

Interactive signaling pathways in the endocrine system are key in determining health and athletic performance in female athletes of all ages. Any disruption to these pathways can lead to suboptimal health and athletic performance, both in the short term and the longer term. Disruption in hormonal network feedback loops could be due to an endocrine condition per se, or failure to optimally integrate the periodization of exercise, nutrition, and recovery. Low energy availability occurs where nutritional intake is not sufficient to cover expenditure from training and resting metabolic rate. In this situation the body goes into energy saving mode, including downregulation of the hypothalamic-pituitary axis. In female athletes of reproductive age this manifests itself as amenorrhea. Together with low estrogen and other key hormones such as insulin-like growth factor-1 (IGF-1), bone health can be impaired, as described in the female athlete triad. Beyond effects on the reproductive axis and bone, low energy availability is now recognized to cause other adverse health and performance effects according to the relative energy deficiency in sport (RED-S) model. Low energy availability can arise unintentionally, such as by an increased training load not matched by an increased nutrition intake, or intentionally in sports/dance, where low body weight confers a performance or aesthetic advantage. Nevertheless, RED-S is diagnosis of exclusion and in the case of amenorrhea in any woman, whatever the level of exercise, medical causes should be excluded. Indeed, performing as a world-class athlete and maintaining regular menstruation is not only possible, furthermore essential, as a fully functioning endocrine system is required to back up the training adaptations sought to improve performance. This fact can act as an incentive for female athletes to address low energy availability, not only to prevent injury, but also to allow achievement of full athletic potential.

Jenni Jones, MSc MBPsS

Performance Psychologist and Doctoral Researcher, Staffordshire University, UK

A performance psychology approach to building confidence

This introductory workshop gave an overview of some of the key aspects used within sport and performance psychology to help individuals develop their sense of confidence. Drawing on recent research, workshop participants were invited to attend to the detailed thoughts, feelings, and behaviors that can contribute to optimal confidence and psychological performance. The workshop gave participants the opportunity to reflect on the aspects of confidence that they could draw upon when facing challenging circumstances. These aspects included developing a sense of self awareness, taking a functional perspective, and seeing themselves and others as role models.

Georgie Bruinvels

Research Scientist, St Mary's University, London, UK, and Orreco, Business Innovation Centre, National University of Ireland, Galway, Ireland

The menstrual cycle, iron deficiency and exercise

Bruinvels, G.[1,2], and Pedlar, C. R.[1,2]

[1]St Mary's University, London, UK; [2] Orreco, Business Innovation Centre, National University of Ireland, Galway, Ireland

More than half of exercising women cite that their menstrual cycle disrupts their training and performance. As discussion around the menstrual cycle is increasingly becoming normalized, the reasons for this need to be elucidated. Those who exercise have an increased susceptibility to menstrual dysfunction. However, historically, the primary dysfunctions researched are amenorrhea and oligomenorrhea; other dysfunctions may be overlooked. In the absence of a universally accepted diagnosis, identification of the prevalence of heavy menstrual bleeding (HMB) has been problematic. However, with the recent creation of a number of more objective diagnoses, identification can be facilitated. Accordingly, 36% of marathon runners were recently found to have a history of HMB (Bruinvels, Burden, Brown, Richards, & Pedlar, 2016). Given the already increased susceptibility to iron deficiency in those who exercise, risk is likely exacerbated in those with HMB. However, both the lack of awareness and the lack of appreciation for what is normal means that screening is rare. While the impact of iron deficiency anemia is established, the consequences of iron deficiency without anemia, particularly in those who exercise, is inconclusive (Burden, Morton, Richards, Whyte, & Pedlar, 2015). Presentation aims were to: a) Highlight the potential prevalence and impact of HMB on iron status when using a self-report diagnostic series; and b) demonstrate current understanding of iron deficiency in exercising women, discussing diagnosis and best practice around supplementation. A clear consensus is required around HMB diagnosis, and

sports practitioners need to be aware that this condition warrants consideration in athletes. If suspected, iron status should be evaluated, while further medical input is required to check for any underlying pathology. The point at which intervention is warranted for iron deficiency should be carefully assessed alongside consideration for best supplementation strategies where necessary (Stoffel et al., 2017). Serum ferritin in isolation to identify iron status should be used with caution; ideally other markers of iron status should be measured and tracked longitudinally.

Dr. Claire-Marie Roberts

Co-Programme Leader MSc Sport & Exercise Psychology, and Senior Lecturer in Sport & Exercise Psychology, University of the West of England, Bristol, UK

Motherhood as an athletic career transition in female Olympic athletes

Roberts, C. R.[1] and Kenttä, G.[2]

[1]University of the West of England, Bristol, UK; & [2]Swedish School of Sport & Health Sciences, Stockholm, Sweden

Motherhood has been deemed incompatible with an athletic career, with women encouraged to end their involvement in sport to have children. However, there are a growing number of women who achieve both personal and high-performance sport goals. For these women, having a child during the course of a sport career can be viewed as an athletic career transition – one that causes a significant interruption to their career trajectory, bringing with it a unique set of demands that requires coping processes to allow a return to elite sport. Our qualitative investigation focuses on three successful Olympians who have balanced motherhood with the highest level of training and performance. We aimed to uncover the experiences of the participants during this unique transition. The participants all decided to have a child during their athletic career and to return to Olympic-level training and competition. Data were gathered qualitatively via the participants' compilation of a memory book containing pictures, cards, cuttings, notes, and drawings representing this time of their lives, which generated discussion with the researchers during an interview. The interview transcriptions were analyzed inductively using thematic analysis. Participants cited examples of the injustice of biology as a female athlete. Nevertheless, in their quest to become mothers, participants reported combining pregnancy with a lengthy period of injury rehabilitation to use their downtime effectively. During pregnancy, all athletes experienced a cut in or removal of funding, or a loss of sponsorship, forcing them to return quickly after childbirth. Postpartum, there were expectations of enhanced physiological performance as a

result of increased blood volume and greater range of movement in joints. This advantage was counterbalanced by the scheduling of training and competitions which were incompatible with motherhood. Yet, motherhood brought psychological benefits of a broader identity and an opportunity to disconnect from poor performances. Much more work is needed to understand how best to support pregnant and nursing athletes in elite sport.

Dr. Rachael Bullingham

Senior Lecturer in Physical Education, University of Worcester, UK

Homophobia in women's sport

Articles published since the 1980s have highlighted the extent of homophobia in women's team sports in the United Kingdom. The peak of homophobia was in the 1980s; however, since 1985, society has become more inclusive with homophobia in steady decline. This positive trend has been examined within the American collegiate athletic system and has shown a positive shift for female athletes (Anderson & Bullingham, 2015; Fink, Burton, Farrell, & Parker, 2012). However, there is a dearth on its application to the plight of elite lesbian athletes, especially in the United Kingdom. This presentation showed the initial findings from interviews conducted with elite athletes (national league level to international) lasting around 45 minutes. Interviews were coded using Braun and Clarke's (2013) six phase thematic analysis process. The four participants were aged between 24 and 34, playing either football and rugby to elite levels. The initial results have shown a decline in homohysteria from the athletes within the sport as well as cultural improvements. Additionally, team climates have been found to be inclusive; athletes felt safe to be "out" and "open". In fact, these athletes used the support of the team to tell family and friends, showing a significant difference from previous research. Coming out within the team was done without any event. Again, this is a change from previous findings, in a process described here as "coming out quietly". While it is clear that more data are needed to establish if this trend can be seen consistently across a range of teams and sports, athletes interviewed have shown support from fans and most coaches; however, there is some room for improvement with some coaches and some experiences at international level.

Dr. Ralph Smith

Specialist Registrar in Sport and Exercise, Department of Sport and Exercise Medicine, Nuffield Orthopaedic Centre, Oxford University Hospitals NHS Trust, Oxford, UK, and Physical Activity and Pregnancy Study, University of Oxford, UK

From research to design of the Chief Medical Officers infographic, "Physical Activity for Pregnant Women"

Smith, R.[1], Reid, H.[1], Matthews, A., [2]Calderwood, C.[3], Knight, M.[4,5] and Foster, C.[5,6]

[1]Department of Sport and Exercise Medicine, Nuffield Orthopaedic Centre, Oxford University Hospitals NHS Trust, Oxford, UK; [2]Nuffield Department of Population Health, University of Oxford, UK; [3]Chief Medical Officer for Scotland, Edinburgh, UK; [4]National Perinatal Epidemiology Unit NPEU, Oxford, UK; [5]On behalf of CMO Physical Activity Expert Committee for Physical Activity and Pregnancy; [6]University of Bristol Centre for Exercise, Nutrition and Health Sciences, School for Policy Studies, Faculty of Social Sciences and Law, Bristol, UK

The 2011 UK Chief Medical Officers' (CMO) Physical Activity (PA) recommendations led to the development of a series of simple evidence-based infographics designed to empower health care professionals (HCPs) to promote PA behavior change across the life course. Remarkably, pregnant women were the only group of the population omitted from the CMOs' 2011 PA recommendations. To address this, an Expert Committee were tasked to provide evidence-based recommendations in the form of an infographic. Initially, a systematic review of reviews of the epidemiological evidence related to PA and pregnancy outcomes was conducted, followed by a structured review of key qualitative studies, current grey literature, and relevant existing infographics. Finally, expert professional opinions were sought using the FUSE Network (Centre for Translational Research in Public Health). The committee then developed an infographic which was subsequently field-tested with over 250 HCPs. The infographic is the final product of this process and is the latest addition to the series. It aims

to provide clarity and a consistency to equip HCPs to deliver evidence-based recommendations to enhance antenatal care, allowing women the confidence to experience the benefits of being active throughout pregnancy. It aims to convey the positive message of encouraging women to incorporate PA into their daily routines with specific examples of suitable activity underpinned by key primary safety messages. This resource has been designed to help HCPs to facilitate effective PA counselling and aid consultations. Unique to this infographic, there is an additional link with further details and the supporting evidence presented in a guidance document. We urge all readers to share this infographic across their professional networks empowering HCPs to advise patients on PA throughout pregnancy with confidence and clarity ensuring best clinical practice.

Mr. Michael Dooley, MMS, FRCOG

Consultant Sports Gynecologist – The Poundbury Clinic, UK

To bleed or not to bleed: The benefits and risks of menstruation and sport

Regular menstruation is generally a symptom of good health. Lack of regular menstruation can be associated with pathology, including RED-S, premature menopause, thyroid abnormalities, and hyperprolactinemia. Premenstrual syndrome can be associated with performance variation for many women and can cause concern for the athlete.

This talk covered the topic of menstruation and health. Whether menstruation itself has a negative or positive effect on performance was discussed or whether it is the cyclical hormonal variation that is occurring that is the cause. Delaying menstruation is now very topical – the risks, benefits, and legal issues were discussed, and a protocol was proposed.

Abstracts from lightening talks

Wednesday June 13, 2018

The 12-lead ECG of the elite female football player: The impact of different interpretation criteria used in pre-participation screening

Mohammad, A., George, K., Oxborough, D., and Somauroo, J.

Liverpool John Moores University, UK

The Electrocardiogram (ECG) of athletes can present with distinct characteristics that are different from healthy controls and constitute part of the phenotype of the AH. Different criteria exist for athlete ECG interpretation as likely “training related” (physiological) or “training unrelated” (pathological) adaptations. Early criteria from the European Society of Cardiology had a high prevalence of false-positive outcomes. Newer, “Seattle” and “Refined” ECG criteria have resulted in lower false-positive rates in male athletes whilst maintaining pathological disease detection. These criteria have never been compared in elite female athletes. This study compared the European Society of Cardiology, Seattle, and Refined criteria interpretation of the 12-lead ECG in elite female footballers. 81 elite female footballers (age: *M* = 21, *SD* = 4 years) underwent pre-participation screening. All athletes had resting blood pressure assessed, a resting 12-lead ECG, and a resting echocardiogram performed. Standard ECG parameters were measured, and the European Society of Cardiology, Seattle, and Refined criteria were applied to all ECGs. Percent false-positive rates were presented for each ECG criteria after completion of screening in all athletes. Based on ECG, echocardiography and/or follow-up investigations, all athletes were considered healthy with no evidence of underlying cardiac disease. According to the European Society of Cardiology criteria, 20 of the athletes presented with likely training-unrelated (abnormal) ECGs that would require athletes to undertake further diagnostic tests. This represented a false positive rate of 24.7%. The false-positive rate was reduced to 0%

following application of both the Seattle and Refined criteria to the interpretation of the same ECG. This was because of changes in the cut-offs for short and long QT syndrome and intraventricular conduction delay duration as well as the removal of right ventricular hypertrophy (RVH) as a lone abnormal finding in the Seattle and Refined criteria. Compared to the European Society of Cardiology ECG interpretation, the use of the Seattle or Refined Criteria reduced the number of athletes from 24% to 0% who would have been classified as abnormal and recommended to undergo further follow-up tests. The integration of the Seattle or Refined criteria into elite female footballers' pre-participation screening could lessen the additional time and cost burden of follow-up tests as well as reducing athlete anxiety. Confirmatory analysis is important, as is further research with different groups of female players (sport, level, and ethnicity).

Fetal heart rate response to exercise in pregnant women with BMI > 25 kg/m^2

Roldan-Reoyo, O.[1], Pelaez, M.[2], and Barakat, R.[3]

[1]Swansea University, UK; [2]University of the Atlantic, USA; [3]Technical University of Madrid, Spain

Being overweight or obese during pregnancy can trigger pregnancy-related diseases that affect the woman and/or the fetus during pregnancy and later in life (ACOG, 2015). Previous research has shown an enhancement in fetal cardiovascular response in exercise mothers (May, Glaros, Yeh, Clapp, & Gustafson, 2010). However, little is known about fetal heart rate (FHR) response in fetuses from overweight/obese pregnant women and the effect of exercise. To investigate FHR response to exercise in fetuses from overweight/obese pregnant women. Pregnant women participated in the study and were divided into two groups – an Exercise Group (EG) or a Control Group (CG). The EG participated in a 24-week supervised exercise program. The CG followed standard health care. All participants carried out a FHR testing protocol between 34 and 36 weeks of gestation, which consisted of 3 min walking at 60% heart rate (HR) reserve. Maternal HR (MHR) and FHR at rest, FHR after exercise, and MHR and FHR recovery time were measured. Eighty one pregnant women participated in the study, of whom only 52 were overweight/obese (EG = 26, CG = 26). There were no significant differences between groups in the following variables (p > .05): MHR = 89 beats/min EG versus 89 beats/min CG; FHR = 144 beats/min EG versus 143 beats/min CG; FHR after exercise = 145 beats/min EG versus 150 beats/min CG; difference between resting FHR and FHR after exercise in EG: 144 beats/min versus 145 beats/min; MHR recovery = 11.8 min EG vs 13.3 min CG. Significant differences were found in the following analysis (p < .05): FHR recovery = 4 min EG versus 8.5 min CG; and difference between resting FHR and FHR after exercise in CG = 143 beats/min versus 150 beats/min. Exercise during pregnancy might have an enhancement effect in FHR response in overweight/obese women due to a faster fetal recovery after exercise and no significant

difference between resting FHR and FHR after exercise in EG-fetuses. However, more research is needed in this field to reach consensus.

The effect of amenorrhea in elite female endurance runners during youth on bone density and strength in later life

Piasecki, J.[1], Ireland, A.[2], Piasecki, M.[4], Hannam, K.[3], Deere, K.[3], Hartley, A.[3], Tobias, J.[3] and McPhee, J. S.[2]

[1]Musculoskeletal Physiology Research Group, Sport, Health and Performance Enhancement Research Centre, School of Science and Technology, Nottingham Trent University, UK; [2]School of Healthcare Sciences, Manchester Metropolitan University, UK; [3]Musculoskeletal Research Unit, School of Clinical Sciences, University of Bristol, UK; [4]Medical Research Council-Arthritis Research United Kingdom Centre of Excellence for Musculoskeletal Ageing Research, University of Nottingham, UK

The physiological stresses associated with intense exercise alongside a low energy availability can disrupt normal homeostatic processes, altering menstrual cycle and impacting on bone health. It remains unknown if a period of amenorrhea during youth can alter bone health later in life. The aim of the study was to determine whether amenorrhea during youth is associated with lower bone strength in old age. The study received ethical approval and participants provided written, informed consent. Bone mineral density, measured by dual energy X-ray absorptiometry (DXA), was compared between three groups: older amenorrheic athletes (OAA, n = 5, age M = 66.6, SD = 3.38 years), reporting an average duration of amenorrhea for three years during their youth; older eumenorrheic athletes (OEA, n = 34, age M = 70.3, SD = 6.61 years), no amenorrhea in their youth; and controls (C, n = 30, age M = 73.1, SD = 4.45 years) non-athletic women with no amenorrhea during their youth. All athletes were endurance based and had achieved a competition race time within 20% of the world record for their age within the previous two years, at the time of recruitment. Univariate analysis was carried out with adjustment for age. The bone mineral density (BMD, g/cm^2) in the legs, spine, pelvis, and hip was not different between any of the groups. Total body BMD was greater in OEA than OAA (p = .032). Further hip structural analysis revealed that OEA had a significantly greater strength index at the femur (p = .02)

than controls. There was no difference between athlete groups or OAA and controls. Cortical neck width, cross section moment of inertia, and cross-sectional area were similar between all groups. It is clear from hip structural analysis that the OEA have an increased bone strength at the hip compared with OAA. This demonstrates that a short duration of amenorrhea during youth can have an impact on bone health later in life, despite regaining menstruation.

Female participation in the only sex-integrated summer Olympic sport

Dumbell, L.[1] and De Haan, D.[2]

[1]Equestrian Performance Research and Knowledge Exchange Arena, University Centre Hartpury, UK; [2]Faculty of Law, Economics and Governance, Utrecht University, The Netherlands

For the first time, every participating nation sent at least one female athlete to the 2012 Olympic Games in London. At the Rio Olympics in 2016, 47% of the medal opportunities were open to women; in total 45% of all athletes were female and some nations, such as the USA, sent more female than male athletes. The policy changes implemented by the International Olympic Committee (IOC) are examples of a liberal feminist approach, requiring sports to offer females opportunities to compete. To consider whether a sex-integrated sport can support women to compete as equals. Equestrian sport at the Olympics has a long history and since 1964 has been sex-integrated within all disciplines. Within a sex-integrated sport, athletes do not have to fulfill any sex-related quota, so, in theory, if all the best athletes were men, then only men would be participating. Overall at Rio 2016, 45% of athletes were female, and within equestrianism 38% were female, a similar figure. Interestingly, the four most dominant Olympic equestrian nations in the 21st century had more female representation than the average. Discussions on sport and gender are often focused on the physicality or the performance aspect which highlights the differences between the sexes based on the biological and socially constructed gender order in society. As Dashper (2012, p. 215) explains, in the context of equestrian sport, there are no sex-based biological advantages for either males or females, “within the equestrian partnership the horse will always be the stronger partner”. Equestrian sport does offer a lens to investigate a different approach to promoting female participation in sport.

High Risk, High Reward: The efficacy of injury prevention training is greater in high risk compared to low risk elite female youth soccer players

De Ste Croix, M. B. A.[1], Hughes, J.[1], Datson, N.[2], and Taylor, L.[3,4]

[1]School of Sport and Exercise, University of Gloucestershire, UK; [2]University of Chichester, UK; [3]The Football Association, UK; [4]Oxford Brookes University, UK

Female youth athletes are classified as a high injury risk group, and injury prevention is important for athlete welfare. The efficacy of robustness training on high versus low risk individuals within high risk groups is currently unknown. The purpose of this study was to explore the efficacy of robustness training on injury risk factors in female youth soccer players and to examine if high risk individuals are greater responders to such training. Elite youth female footballers (*n* = 125) on the English Football Association talent pathway were randomly selected into a training (*n* = 71) or control group (*n* = 54). Relative leg stiffness, 2D knee valgus and knee flexion range of motion (ROM) from a single leg countermovement jump and knee abduction moment (pKAM) risk were all determined before and after a 16-week robustness training program. For further analysis, participants in the training group were split into high (pKAM > .80; *n* = 33) and low risk (pKAM < .55; *n* = 33) groups. Magnitude-based inferences were used to explore differences between the control and intervention and the high and low risk groups. Beneficial effects in the training group were observed for knee valgus, pKAM, and leg stiffness compared with the control group. The control group demonstrated more beneficial changes in knee flexion ROM than the intervention group. The high-risk group demonstrated greater beneficial effects of the training compared to the low-risk group for all parameters. Our findings show an increase in knee valgus risk through normal growth and maturation, reinforcing the need for intervention programs in female youth athletes. Robustness training induces significant beneficial improvements in injury risk factors in female youth soccer players. The beneficial effects of this multidimensional programme are greater in those individuals who are classified as high risk.

Risk factors associated with stress fractures in female dancers compared to female non-dancers: an observation cross-sectional study

Davis, S., Bestwick-Stevenson, T., and Edwards, K. L.

University of Nottingham, UK

The prevalence of stress fractures for dancers varies between 6% and 63% dependent on dance genre – ballet (63%) and tap (6%). Diet and dance exposure are risk factors for stress fractures. While diet has been shown to have a wider impact on bone health in other athletic populations, there is relatively little research in this area. To determine if there is any difference in the risk of stress fracture in dancers versus non-dancers and investigate association between diet, dance exposure, and stress fracture. This was an observational study. Female dancers were recruited from dance groups, and non-dancers were recruited from Nottingham. The questionnaire included a short food frequency questionnaire for typical weekly diet, dance exposure (hours/week and years dancing), stress fracture history, and demographic data. A K-means' cluster analysis was used to group participants into categories of dietary pattern according to the food frequency data. There were 63 dancers and 46 non-dancers recruited, with six stress fractures in four dancers (6%) and one stress fracture in one non-dancer (2%). Dancers' relative risk of stress fracture was 2.9 times higher than that of non-dancers, but the difference was not statistically significant ($p > .05$), 95% CI (6.6-7.4). The K-means cluster analysis formed four dietary patterns labelled: 1) unhealthy; 2) high whole meal, cheese, and fish; 3) balanced; and 4) high fiber, fruit/vegetables, and low meat. The model was a good fit and statistically valid ($p < .05$). Multivariate logistic regression modelling showed no statistically significant differences between dancers with/without stress fracture for dancer status, years of dance (95% CI = 26.5, 33.9), dance genre, age, dietary cluster, alcohol units, and ethnicity ($p > .05$). Dietary pattern amongst other risk factors was not shown to change the risk of stress fracture in dancers. These results should be interpreted with caution as this was a small study with a low number of stress fractures.

The prevalence of pain in international female event riders during competition, in the United Kingdom

Lewis, V., Baldwin, K., and Dumbell, L.

Equestrian Performance Research and Knowledge Exchange Arena, University Centre Hartpury, UK

Eventing is one of three Olympic disciplines of equestrian sport, the only sex-integrated summer Olympic sport. At Rio 2016, 34% of Eventing competitors were female and within Team GB the odds ratio of a representative being female (compared to male) was 3.33, the highest of all the disciplines. To compare the prevalence of event riders at the international level competing with pain between the sexes. Thirty-one four-stage questionnaires were completed by international event riders (FEI CCI *, CCI **, CIC ***) at the Hartpury International Horse Trials, UK. Participants included 18 female riders and 13 male riders, with an age range of 18-55 years. Ninety-six percent of international event riders competed while experiencing pain. All female riders reported pain, giving a significant association between gender and pain (X^2 = -.479, p = .006). Fifty-five percent of riders felt that their pain affected their riding performance. Pain was perceived to influence performance by affecting fatigue, their concentration, and anxiety levels. Ninety-six percent of riders reporting pain used medication to alleviate their symptoms. This high incidence of international event riders who compete with pain could potentially increase the risk of a serious or fatal fall in the cross-country phase. One in five equestrian athletes is seriously injured during their riding career (Ball, Ball, Mulloy, Datta, & Kirkpatrick, 2009) with Eventing widely considered the most dangerous Olympic equestrian discipline. This research self-reports riders' perceptions, which may affect the data.

Using social media to engage with female coaches: A small-scale action research project

Dray, K.[1], Dunin, J. [1], Stanton, P. [1], Arnold, L.[2] and Drake, C.[2]

[1]Canterbury Christ Church University, UK; [2]Project 500 (More Women, Better Coaching)

Women in coaching represent the minority. Government statistics suggest they comprise only 30% of the coaching workforce, and only 17% of qualified coaches, despite recent research suggesting that having female role models should be a goal for programs designed to get girls more physically active (Young et al., 2015). Providing support for female coaches is increasingly recognized as integral to policy and practice. To explore how coaches engage with, and implement new ideas from, the Project 500 (More Women; Better Coaching) social media channels. An online survey was conducted with 32 female coaches of various qualification status, averaging 12.6 years of coaching experience, coaching (on average) 11.4 hr per week, recruited through the social media (Twitter and Facebook) channels of the project. Preliminary findings are presented here. Social media channels were reported to be most useful for developing practice ideas and information on upcoming events, and were used mostly because they were deemed free, relevant, and trustworthy. Further analysis suggested that those who reported rarely implementing ideas from the sites, reported less knowledge and opportunities to do so, compared to those who used ideas more frequently ($p < .05$). In addition, when comparing coaches across qualification levels, those with lower qualifications, reported relatively lower levels of knowledge, confidence, skills, opportunities, and motivations to implement new ideas ($p < .05$). This small-scale action research study explores some of the barriers female coaches face in implementing new ideas from dedicated coaching social media resources. Opportunities exist to develop these resources to help alleviate some of these barriers, particularly in less qualified coaches.

Abstracts from lightening talks

Thursday June 14, 2018

How a blended curriculum engages girls in activity in challenging spaces

Corne, H.

Mini Mermaid, UK

The aim of this presentation was to unpack successful elements of Mini Mermaid Running Club (MMRC) UK, specifically the way the unique curriculum, which prioritizes understanding the self, enhances girls' physical self-efficacy. The aim of the presentation was also to show the impact of a relevant curriculum to engage girls effectively with their physical selves. Importantly, MMRC UK works in areas of economic disadvantage, tackling and challenging inequalities and working to raise expectations of young girls through the bespoke curriculum. Mini Mermaid UK (est. 2015) aims to increase physical activity in girls whilst enhancing their confidence and self-belief. The program uses an innovative blend of journal work via a curriculum alongside physical activity. Recent qualitative research using thematic analysis demonstrated five key benefits which emerged for girls as a result of engaging in the Mini Mermaid program, which were

- getting to know their inner self;
- developing resilience;
- managing peer relations;
- physical self-awareness; and
- disrupting normal (a unique experience).

There was also a marked difference observed in girls' physical endurance and physical self-efficacy. The programme gives girls a platform to be heard and from this, a core theme emerging from research is the way the programme gives girls "tools" to get to know

themselves better. There was an apparent shift in girls' self-belief, particularly around the ability to understand what it meant to set a goal, work for it, and then achieve it.

Can exercise training improve the frequency and severity of hot flushes in breast cancer patients taking aromatase inhibitors?

France, M.[1], Brislane, A.[1], Holcome, C.[2], Low, D.[1], & Jones, H.[1]

[1]Liverpool John Moores University, UK; [2]Royal Liverpool and Broadgreen University Hospital, UK

Hot flushes are experienced by approximately 70% of breast cancer patients (Antoine et al., 2008), due to endocrine treatment compromising ovary function. Exercise training improves hot flush frequency and severity in postmenopausal women through enhancing cardiorespiratory fitness and improving thermoregulatory and vascular control (Bailey et al., 2016a; Bailey et al., 2016b), yet it is unknown whether exercise training can have a similar impact on women undergoing endocrine treatment to suppress estrogen production. The aim of the current study, therefore, was to determine whether improving thermoregulatory and vascular control mechanisms with exercise training could alleviate hot flushes and their associated quality of life symptoms in breast cancer patients. Eight breast cancer patients, having completed treatment (age, *M* = 53, *SD* = 8; Body Mass Index [BMI], *M* = 29, *SD* = kg/m^2) completed a 16-week exercise intervention consisting of 30-60 min moderate intensity supervised exercise training 3-5 times per week. Self-reported hot flush frequency and severity were recorded before and after the intervention. Physiological hot flushes were recorded through measurement of skin blood flow and sweat rate, from which thresholds for vasodilation and sweating could be established. Following training, no significant changes in cardiorespiratory fitness occurred (0.58 $ml \cdot kg^{-1} \cdot min^{-1}$ [95% CI = -6.47, 7.62 $ml \cdot kg^{-1} \cdot min^{-1}$], p = .81). Exercise training-mediated reductions in self-reported frequency by 18 (95% CI = -38, 75) hot flushes per week and severity of hot flushes by 4 (95% CI = -26, 34) arbitrary units per week (p > .05), yet this did not reach statistical significance. During a physiologically measured hot flush, skin blood flow and sweat rate were 0.34 AU mmHg and 0.02

mg/min/cm^2 lower after exercise training, respectively. The data accumulated so far suggest that exercise training may be beneficial for breast cancer patients on endocrine therapy.

Is lack of knowledge a reason to decrease/stop antenatal exercise?

Parry, S., Roldan-Reoyo, O., Hudson, J., and Lewis, M.

Swansea University, UK

Sixty to eighty percent of pregnant women do not meet antenatal exercise (AE) recommendations (Harrison, Taylor, Shields, & Frawley, 2018). Antenatal exercise is highly recommended since it can help prevent pregnancy-related diseases and health problems later in life for women and their babies (ACOG, 2015). Lack of knowledge and professional guidance are one of the main reasons that women decrease/stop exercising in pregnancy. In Wales, 45% of women fail to meet physical activity guidelines (Townsend, Bhatnagar, Wilkins, Wickramasinghe, & Rayner, 2015) and this figure is likely much higher during pregnancy. If women were more aware of the benefits of AE, it would be easier to encourage them to enroll in AE. Use a bespoke questionnaire to determine whether women in Wales are aware of the benefits of AE. We designed an online questionnaire with two sections: 1) Likert scale responses and 2) questions requiring multiple-choice answers. Approval was obtained from Swansea University Ethics' Committee and women aged over 18 years were recruited using email and posters. 127 women answered the questionnaire and were classed as: never pregnant (n = 39), pregnant (n = 18), previously pregnant (n = 70). Analysis of the Likert-response section is presented here. There were no significant differences in responses between groups for any of the questions, so the group-wide responses are presented. Women agreed or strongly agreed that exercising during pregnancy: would improve their health (96.9%); would improve their baby's health (81.9%); might affect their labor (87.4%); would help them to avoid gaining too much weight (88.2%); would help them to have a faster recovery during postpartum (91.8%). In addition, 75.6% answered agree/strongly agree to being keen on enrolling in AE. Lack of knowledge does not seem to be a reason for reducing/stopping AE. This suggests that other reasons for low AE engagement should be explored.

Barriers and facilitators towards antenatal exercise

Roldan-Reoyo, O., Parry, S., and Lewis, M.

Swansea University, UK

A research project based in an Antenatal Exercise Program (AEP) has been developed to understand the effect of exercise in maternal/fetal cardiovascular adaptations. Nevertheless, before running the project, it is important to know what enables/stops women from antenatal exercise (AE). Specially in Wales, 54% of women are overweight/obese and do not meet exercise recommendations (Townsend, Bhatnagar, Wilkins, Wickramasinghe, & Rayner, 2015). This figure is likely much higher during pregnancy and could increase the risk of developing pregnancy-related diseases (Nucci et al., 2018). To understand the barriers and facilitators towards AE. We designed an online questionnaire with two sections: 1) Likert scale responses and 2) questions requiring multiple-choice answers. Approval was obtained from Swansea University Ethics' Committee and women aged over 18 years were recruited using email and posters. One hundred and twenty-seven women in Wales answered the questionnaire: never pregnant (*n* = 39), pregnant (*n* = 18), previously pregnant (*n* = 70). There were no significant differences between groups. Only the most relevant responses from multiple-choice questions are presented. When asked what motivated them to start/continue exercising, most participants noted maintaining their heath and fitness level (88.2%) and doing the best for the baby (72.4%). When asked what exercise they would be happy to perform, 97.6% said walking, 82.7% said swimming, 75.6% said yoga, 72.4% said stretching, 70.1% said pelvic floor exercises, and 0.4% said aqua fitness. Reasons given for stopping exercise included nausea (65.4%), back pain (61.4%), and harming baby (53.5%). Expectations for enrolling in an AEP were that it would make them feel better (88.2%), that it would improve their health (75.6%), that it would help control weight gain (63.8%), and that light AE could be performed (59.8%). These results help us to understand what women expect from an AEP, which kind of activities appeal more to them, and what would stop them exercising. With these results we can design an AEP which match women's expectations. In

addition, we could find better strategies to encourage pregnant women to start or continue exercise during pregnancy.

A qualitative study exploring active charity events as a catalyst for sustained physical activity behavior

McVinnie, Z., Plateau, C., and Stevinson, C.

Loughborough University, UK

Active charity events have been identified as having untapped potential for public health by encouraging physical activity (PA) through charitable and social motives. However, there is limited research on how to convert event participation into sustained PA behavior. This study aimed to understand the role of active charity events in the initiation of PA, and to explore strategies that facilitate sustained PA behavior following an event. Results will help inform the development of an intervention to assist future participants. Semi-structured telephone interviews were conducted with adult women (n = 15), three to four months after completing a Cancer Research UK women-only Race for Life 5-km event. Transcripts were analyzed using thematic analysis. Through exploring event experiences, two key themes emerged: feeling connected (emotional connection to cause, atmosphere at event, camaraderie with people) and sense of achievement (milestones reached, confidence boost from event completion). Similarly, two themes emerged relating to PA experiences: goals (desire to retain fitness, continue training routine) and reinforcements (receiving social support from others, feeling of wellbeing from being active). Particularly for those who trained to run their event, the sense of achievement generated a desire to continue PA in the following months and led to the development of additional goals. These results suggest elements to include in interventions for supporting continued PA post-event. Fostering the feelings of connection and sense of achievement from event completion and encouraging new goal formation with opportunities for social support, may help event participants with PA maintenance.

Exploring girls' engagement in secondary school physical education

Tidmarsh, G.[1], Kinnafick, F.[2], and Johnston, J.[3]

[1]University of Birmingham, UK; [2]Loughborough University, UK; [3]Nottingham Trent University, UK

Girls are participating in physical activity less than the daily recommendations of 60 minutes of moderate to vigorous activity (WHO, 2015); only 15% of girls aged 11-15 years meet recommended levels (WHO, 2011) and only 8% of girls aged 13-15 years in 2012 (Townsend et al., 2015). Two separate, but related, studies qualitatively explored girls' engagement in secondary school physical education (PE). Study one explored girls' perceptions of participation in PE. Informed by study one, study two explored boys' perceptions of girls' participation in PE. Both studies utilized a qualitative design; participants were recruited using purposive sampling. Study one participants (female, n = 30, age M = 13.4, SD = 1.6 years) took part in one of five focus groups according to their year group (years 7-11). Study two participants (male, n = 43, age year 7, M = 12.3, SD = .53 years, year 10, M = 15.2, SD = 0.49 years) took part in one of eight focus groups according to their school (n = 4) and year group (years 7 and 10). Focus groups were transcribed verbatim and thematically analyzed in accordance with Braun and Clarke (2006). Rigor was established via all authors acting as critical friends and reviewing themes on multiple occasions. Six key themes emerged; study one included enjoyment, motivational climate, and perceived competence. Participants discussed the importance of variety and choice, the effects of observation, peer groups, gender stereotypes, and increased confidence around people of similar ability, all of which influenced enjoyment and effort levels. Study two themes were perceived self-efficacy of girls, awareness of and conformity to gender stereotypes, and structure of the PE environment. Participants discussed the possibility of restructuring PE from gender split to mixed gender sets organized by ability. We propose that PE lessons could be grouped by ability, which includes an education program focused on task

involvement aimed at overcoming gender stereotypes, increasing enjoyment, and improving the motivational climate.

A preliminary investigation of the motivations for participation, held by female performance soccer players

Mulvenna, C., and Leslie-Walker, A.

University of Bolton, UK

Women's football (soccer) in England has provided increasing opportunities for players to become professional since the inception of the Women's Super League (WSL) in 2011. Several players are at the fringe of embarking upon professionalization; however, does the WSL offer intrinsic motivation to promote a professional soccer player career or are there alternative reasons for participation? Furthermore, does the coach behavior meet the players' motivation for participation? identify the motivations for participation held by female performance soccer players participating in formal coaching sessions. To ascertain the methods that coaches use to meet the motivations of their players for attending coaching sessions. Semi-structured interviews were carried out with 12 female soccer players participating in step three of the Women's Pyramid of Football. The coach of the players was also interviewed. The interviews were transcribed and coded using critical thematic analysis and latent themes were identified. The players interviewed for this study identified three key reasons for participating in soccer, which were

- the social interaction and the feeling of belonging to a team or organization that values their input;
- the desire to learn and develop as a soccer player both technically and tactically; and
- the reward of feeling like they have worked hard physically.

Female performance soccer players participate in soccer primarily for the sense of belonging and community offered by being a part of a soccer club. It is apparent that a clear structured method is not utilized by the soccer coach to create this sense of community and belonging; however, to increase the development of these motivations, the formation of a model may be useful for the future promotion of a professional soccer career for females.

“If they’re caked in make-up I just laugh”: Girls’ and women’s football and the apologetic turn

Pielichaty, H.

University of Lincoln, UK

Football (soccer) has long been woven into Britain’s cultural tapestry as a “men’s sport” and women have been fighting for over a century to have their sport recognized on an equal basis. This study explored what football means to the girls and women who play, with a particular emphasis on body, beauty, and image. A critical feminist approach was used to enable participants’ voices to be heard above the “noise” of stereotypes about the suitability and appropriateness of women and girls to football. During the 2013/14 football season, ethnographic research was conducted at a Centre of Excellence and in a secondary school. Conversations and focus groups with players and family members took place in conjunction with fieldwork observations. Conversational interviews were also conducted with family members in their homes. Over 120 informants took part in the research. Models were adopted from socio-psychology to unearth how identities were negotiated within and outside of football spaces. The findings demonstrated that players were unapologetic about their participation and enjoyment of football and in a departure from previous research, were critical of overt displays of femininity for fear it would jeopardize the credibility of the women’s game. This was termed the Apologetic Turn. Emphasized feminine displays were associated with weaker footballing ability and were heavily scrutinized and denounced by other players. This study has implications for policy and strategy with regards to the “packaging” of new football initiatives and raises concerns about the seriousness of the sport being diluted amidst a rhetoric of participation and inclusivity.

Teammate influences on the eating attitudes and behaviors of female athletes

Scott, C. L., Haycraft, E., and Plateau, C. R.

School of Sport, Exercise and Health Sciences, Loughborough University, UK

Prevalence rates for disordered eating and compulsive exercise behaviors are higher for female athletes compared to non-athletes. As athletes spend much of their time with teammates, investigating the potential role that teammates may have on these unhealthy behaviors is vital. To comprehensively assess the relationships between numerous teammate influences (e.g., perceived pressure, teammate relationship quality, team norms) with disordered eating and compulsive exercise behaviors in female athletes from a range of sports, competitive levels, and ages. A cross-sectional survey was completed by 727 female athletes (age *M* = 24.6 years) from both lean (*n* = 467) and non-lean (*n* = 260) sports. Participants answered questions relating to their teammate relationships and eating habits, and their own eating attitudes and behaviors, and attitudes towards exercise. Differences between lean and non-lean sport female athletes were explored via Mann-Whitney U analyses. Correlations and hierarchical regressions were conducted to establish the nature of any associations between measures of teammate influence with disordered eating and compulsive exercise behaviors. There were no significant differences between lean and non-lean athletes for the disordered eating, compulsive exercise, and teammate influence variables. Numerous teammate influences were significantly correlated with disordered eating and compulsive exercise behaviors, and regressions, to identify the best predictors, and revealed that supportive teammate relationships significantly predicted lower levels of disordered eating and weight control behaviors. However, perceived pressure from teammates to lose weight/change shape, as well as perceptions that teammates engage in disordered eating, significantly predicted the athletes' own disordered eating and compulsive exercise behaviors. Teammate influences may positively and negatively impact female athlete eating and weight-control behaviors. Further research is required to establish the

circumstances under which teammates can be most influential, to inform the future development of holistic team-based interventions to prevent disordered eating in sport.

The representation of weight, bodies, and health in Sport England's This Girl Can – a multimethod case study

Sweetman, M., and Flint, S. W.

School of Sport, Leeds Beckett University, UK

Normative discourses in the UK regarding weight suggest that fat bodies are unhealthy, undesirable, and the product of immoral, poor lifestyle choices. Despite calls for a Health at Every Size approach, physical activity interventions often contain material that explicitly or implicitly (re)produce this discourse. Experiences of weight stigma are associated with reduced wellbeing and physical activity participation. Sport England's This Girl Can (TGC) campaign is reported to have encouraged 2.8 million women to engage in more physical activity, narrowing the "gender gap". The campaign's success is often attributed to its inclusive nature, which purportedly encourages women of all shapes and sizes, ability levels, and backgrounds. This study used a multimodal discourse analysis of TGC-campaign material to explore the representation of weight, bodies, and health. Two key discourses emerged: "Love Yourself" and "Sisterhood". These offer more inclusive and diverse understandings of healthy bodies and physical activity motivations than traditional focuses on weight loss. However, a third, subtler, and pernicious discourse, "Thin is still best" was also evident. This discourse reinforced normative understanding of weight loss as a primary goal of physical activity. Data collection from participant observation, interviews, focus groups, and surveys is ongoing to understand women's lived experiences of TGC activities. Once complete, discourses within the ethnographic data will be compared to those already identified in the campaign material above to explore how TGC participants understand weight and to identify if activities are truly available to all.

The physical activity experiences of female international students at a university in London, UK

Collins, A., and Chinouya, M.

University of Liverpool, London, UK

The Chief Medical Officers from the four home countries recommend that adults do 150 min of moderate-intensity physical activity per week. Female international students (FIS)s are less likely to be active than male international students. Evidence shows a high prevalence of overweight and obesity within the student population, which could be tackled with increased physical activity. This study aimed to explore the barriers to physical activity experienced by FISs. A qualitative research methodology was used. Participants were postgraduate FISs at a university in London and were recruited via purposive and snowballing techniques. Data were gathered from 11 semi-structured interviews. Interviews were audio recorded and transcribed using a denaturalized method. Thematic framework analysis was used to organize and interpret the data. Themes explored included being a FIS and experience taking part in physical activity, and how the university could motivate postgraduate FISs to take part in physical activity. Ethics' approval was obtained. Most of the students were not aware of the Chief Medical Officer's recommendations. They experienced barriers to being physically active including language, feeling isolated, the high cost of participation, and lacking in confidence to engage in physical activity in London. Others did not wish to be muscular like men. Images of beauty depicted in the media, participants' religious backgrounds, and living in London all interacted to make it difficult for them to engage in physical activity. To improve the learning experiences of FISs, universities should make physical activity an easier choice by providing options that take account of students' diversity and gendered experiences of living and studying in London. This study adds knowledge to a largely under-researched population in terms of their physical activity

experiences. A limitation is sampling, so the findings are unlikely to be generalizable to the wider FIS population.

Women into sport coaching leadership positions using complexity theory and the principals of leverage to generate change

Piekarz, M.

Coventry University, UK

This work was based on a piece of work commissioned by UK Coaching. It was primarily focused on doing a comparative study between a variety of non-sport sectors, in order for UK Coaching to try and learn from experiences and best practice in other industry sectors. The work involved reviewing literature and data from both sport and non-sport working sectors. This was done for comparison and benchmarking, paying attention to identifying the barriers to progression and the various strategies that can be adopted to enable women to progress more easily to leadership positions. The work was further complemented by conducting primary, qualitative interviews of women who have gained senior leadership positions in a variety of non-sport working sectors. While these interviews can in no way be claimed to be representative, what they did offer were insights and the emotional charge to underpin some of the data, often offering provocative and revealing incidents that give "color" and clarity to the broad data analyzed. Finally, additional data were gained from a number of sport practitioners who attended a dissemination workshop event, where the preliminary findings of this work were presented, discussed, and contextualized to their own working sectors. Based on the meta-review of both sport and non-sport related literature on women and leadership, complemented by the primary interviews, stakeholder workshop and literature review, a framework of analysis was developed which uses complexity/systems theory, the concept of leverage, and stakeholder analysis. Crucially, it is stressed that change can come from many incremental adjustments in practice, by different stakeholders, which may need minimal resources, but which all add up to create more fundamental change. Furthermore, sports capacity for generating emotional engagement and focused moments of interest mean it has a powerful resource to create an emotional charge, which, if

correctly levered (a critical concept), can act as a key driving force in motivating people to bring about change.

Sportswomen as brand ambassadors: The prospects, challenges and possibilities

Mogaji, E.[1], and Badejo, A.[2]

[1]Department of Marketing, Events and Tourism, University of Greenwich, UK; [2]Social Marketing, Griffith University, Australia

The number of women participating in sport has increased over the years. However, the media coverage and marketing has not reflected such progress. It appears that the media are not making enough effort in publicizing women sports and, therefore, the general public may not be as aware of women's sports as they are of men's. Mass media exposure and coverage of a team or event have a strong influence on public opinions, and commercially, advertisers may not be able to tap into their brands. This study aimed to understand the prospect of sportswomen in becoming a brand ambassador, raising the question whether they can be considered as a personal brand with possibilities of earning a significant amount of money from endorsement contracts and the consumers' attitude towards advertisement featuring a sportswoman. Semi-structured interviews with 15 sportswomen, 10 members of the public, and five brand managers were carried out and thematically analyzed. The findings revealed that sportswomen were interested in becoming brand ambassadors but there were limitations they had to face, which included media coverage for their sports, funding, the general attitude towards female sports which they acknowledge is getting better, having the look (competing with fashion models), and being in the right sport (team sports/individual sports). The consuming public were quite positive about the idea, and the Brand Managers noted that sportswomen have to be authentic, tell a story, create an identity, and be appealing to consumers. While the government and media have their role to play, there is the need for sportswomen to take responsibility for their brand awareness – telling the stories on social media, working with a talent agency, and importantly as well, succeeding in their sports. The study extends research on female participation in sports which is significantly under-represented in research in sport, albeit from a business management perspective.

The Women in Sport and Exercise Academic Network is a research-orientated interdisciplinary group that focuses on: generating high quality, impactful research into women in sport and exercise; collaborating and sharing resources; increasing the visibility of issues around women in sport and exercise; and research mentoring

If you would like to join our network, please email: claire-marie.roberts@uwe.ac.uk or j.j.forsyth@staffs.ac.uk