



WELSH INSTITUTE
OF PERFORMANCE SCIENCE
SEFYDLIAD GWYDDORAU
PERFFORMIO CYMRU



**WELSH INSTITUTE OF
PERFORMANCE SCIENCE
ANNUAL REPORT**

2023

THE YEAR IN REVIEW

Following the Birmingham Commonwealth Games, Sport Wales underwent a change in their way of working and we are delighted to continue to be part of this journey. Specifically, Sport Wales has shifted to a themed approach to providing support, identifying three key areas of focus: Athlete Health and Wellbeing, Athlete Development, and Athlete Environments. This shift in approach has afforded Sport Wales and WIPS an opportunity to review their way of working and particularly enabled academics within WIPS to feed into the developing strategies across each of the themes. A number of extensive and insightful scoping reviews have taken place to highlight key priorities and research questions pertinent to each theme. With opportunities for cross and multi-disciplinary working particularly apparent, it is an exciting time for all involved. Moving forwards, each theme within Sport Wales will link to WIPS through a corresponding theme lead (Denise Hill, Health and Wellbeing; Vicky Gottwald, Athlete Development; Camilla Knight, Athlete Environments) ensuring coordinated communication and effective collaborations.

Beyond engaging with Sport Wales in relation to their revised approach, WIPS has continued to conduct and support numerous projects. Specifically, during 2023, members of the WIPS research steering group have been involved in over 20 projects, ranging from understanding peak periods within international football based on GPS data to talent development of high performance beach rowers, athlete recovery behaviours and exploration of female athletes relating to ACL injury, participation of girls in boys football and menstrual cycle experiences between junior and senior athletes. We have also secured additional funding for postgraduate students to further support work across different projects and also expanded our collaboration to include the Football Association of Wales (FAW), increasing research capacity for 2024 and beyond.

Across the projects from this year, and also projects that occurred in previous years, considerable time has also been given to sharing new knowledge and learning through a variety of means. For instance, information pertaining to nutrition behaviours, mental health and wellbeing, and female health



and performance has been shared through our first lunch and learn session with practitioners and coaches from across Wales. The female health and performance project has established a group of seven sport science and medicine practitioners, led by our research associate, to transfer research into practice across sports in Wales.

As we come to the end of the current funding cycle, we have had an opportunity to reflect on the previous 8 years of collaborations that have taken place between Sport Wales and WIPS. Overall, we have been involved in more than 90 projects, engaged with individuals across 17 sports, and shared knowledge through presentations, reports, publications and workshops. This work has only be possible due to the hard work and commitment of the research steering group members from Universities across Wales, alongside athletes, coaches, practitioners, and institute staff who suggest projects, support data collection, and engage with our knowledge dissemination activities. Further, most if these projects would not be possible without the outstanding efforts of the WIPS research associates, PhD students and MSc students who lead data collection and analysis. To all involved, we say a huge thank you!

Wishing you all a happy, healthy, and successful year ahead,

Liam, Kath, Camilla, Esther

and the members of the RSG & SMB

Some Key Points from 2023:



2 new projects completed



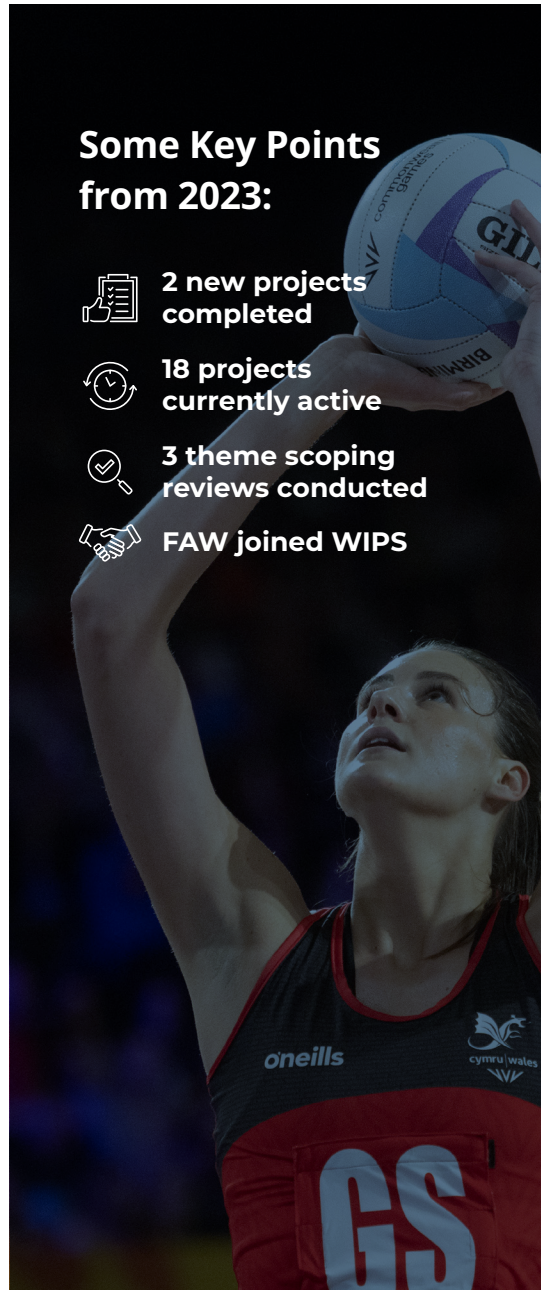
18 projects currently active

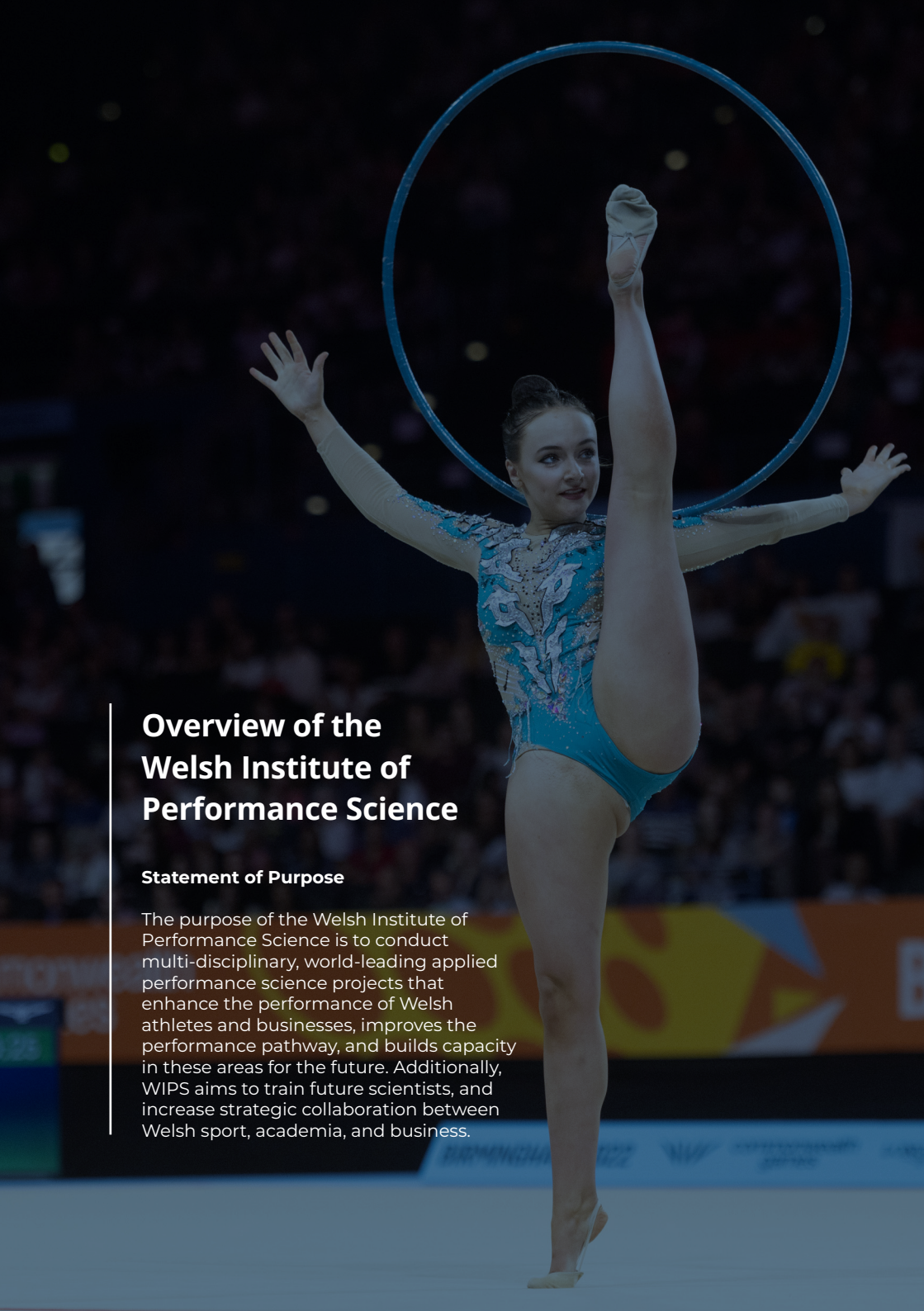


3 theme scoping reviews conducted



FAW joined WIPS





Overview of the Welsh Institute of Performance Science

Statement of Purpose

The purpose of the Welsh Institute of Performance Science is to conduct multi-disciplinary, world-leading applied performance science projects that enhance the performance of Welsh athletes and businesses, improves the performance pathway, and builds capacity in these areas for the future. Additionally, WIPS aims to train future scientists, and increase strategic collaboration between Welsh sport, academia, and business.

FUNCTION AND PROCESS

The Welsh Institute of Performance Science will work to enhance performance in Welsh sport and increase links between sport, academia, and business in the following ways. Priority will be given to the first three approaches:

1. Performance Driven Questions, Science Driven Answers

Following evaluation of Welsh Sport performances and systems, performance issues or areas to improve will be identified; the Research Steering Group and Sport Wales representatives will then discuss and seek out potential strategies, leading to projects being conducted to address the question or issue.

2. Performance Driven Questions, Industry Driven Answers

Following evaluation of Welsh Sport performances and systems, performance issues or areas to improve will be identified; the Research Steering Group will then discuss and seek out potential strategies, leading to collaboration with appropriate industry partners to answer the performance question.

3. Performance Driven Questions, Science and Industry Driven Answers

Following evaluation of Welsh Sport performances and systems, performance issues or areas to improve will be identified; the Research Steering Group will discuss and seek out potential strategies, leading to research being conducted in conjunction with industry partners to answer the performance question/issue.

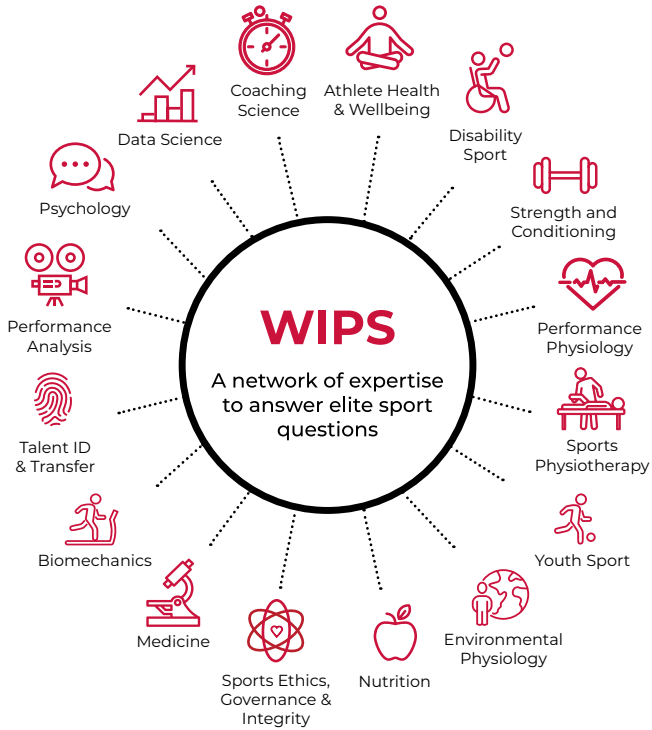
4. Science Driven Performance Applications to Enhance Performance

Based on current research findings, Research Steering Group members can make suggestions to the wider Research Steering Group regarding potential performance enhancing strategies. If the Research Steering Group deem appropriate, research and discussion examining the feasibility and applicability of these strategies to Welsh sport performance will be conducted. If the findings yield positive outcomes these strategies may be implemented within Welsh Sport via Sport Wales Institute.

5. Industry Driven Performance Applications to Enhance Performance

Industrial partners (and other innovation specialists) can approach the Research Steering Group regarding technological or industrial advances that might enhance sporting performance. If deemed appropriate by the Research Steering Group, research and discussion examining the feasibility and applicability of these strategies to Welsh Sport performance will be conducted. If the findings yield positive outcomes these strategies may be implemented within Welsh Sport via Sport Wales Institute.

THE 2023 RESEARCH STEERING GROUP COMPOSITION



THE 2023 THEME LEADS

THEME	SPORT WALES	WIPS
Athlete Development	Matt Archer	Vicky Gotwald
Athlete Environments	Cath Shearer	Camilla Knight
Health and Wellbeing	Kath Brown/Hannah Llewellyn (Maternity Cover)	Denise Hill

EXAMPLES OF PROJECTS COMPLETED OR SUPPORTED BY WIPS THIS YEAR

PROJECT TITLE	PROJECT AIMS	SPORTS & DISCIPLINES INVOLVED
The effect of the menstrual cycle on participation in physical activity in schools across the UK	<ol style="list-style-type: none"> 1) Understand young peoples' perceptions and experiences of menstrual cycle education received at school. 2) Understand reasons why periods affect participation in physical activity. 3) Understand how young people would like to learn and receive information about the menstrual cycle. 	Psychology, Health & Wellbeing
FAW Women and Girls Project – Developing Female Football Players through Integration into Male Competition (Season 2)	<ol style="list-style-type: none"> 1) Continue to assess female players' physical, technical, tactical and psychosocial development as a result of competing in the boy's academy league. 2) Explore the impact of the change in context on the national girls' teams' coaches. 3) Examine the role and experience of the female players' parents as a result of their children competing in a boy's league. 	Coaching Science Psychology FAW
Understanding Peak Periods within International Football based on GPS Data	<ol style="list-style-type: none"> 1) Understand peak periods during international matches across the pathway. 2) Understand if there is a difference between age groups. 3) Investigate any potential gaps between training and match peak periods. 	Data Science FAW Physiology
Talent Development of High-Performance Beach Rowers	<ol style="list-style-type: none"> 1) Identify multidisciplinary factors that contribute to the development of an elite Beach Sprint athlete. 2) Better understand talent transfer pathways into the sport e.g. from alternative rowing disciplines. 3) Inform talent identification and development systems in Beach Rowing. 4) Upskill coaches and support staff to understand the applied relevance of multidisciplinary talent related variables. 	Talent ID Psychology S&C Physiology

<p>Practitioner insights into knowledge, confidence and importance placed on the menstrual cycle when supporting female athletes</p>	<ol style="list-style-type: none"> 1) Continue to identify practitioner knowledge, confidence and importance placed on the menstrual cycle when supporting female athletes through focus groups. 2) Develop education resources and opportunities for practitioners to enhance awareness and knowledge relating to the menstrual cycle. 	<p>All sport science disciplines</p>
<p>Coach education on the menstrual cycle</p>	<ol style="list-style-type: none"> 1) Develop resources including workshops to be delivered for coach education. 2) Record the effect of coach education on knowledge about the menstrual cycle and reported impact on coaching and conversations. 	<p>Multiple Sports</p>
<p>Determining and assessing knowledge, understanding and confidence relating to the menstrual cycle in rugby coaches</p>	<ol style="list-style-type: none"> 1) Determine current knowledge, understanding and confidence of rugby coaches in relation to the menstrual cycle. 2) Assess the effectiveness of delivering a novel coaching programme created to improve knowledge, understanding and confidence of having conversations about the menstrual cycle with female rugby players. 	<p>Coaching Science, Health & Wellbeing</p>
<p>Comparisons between junior and senior athlete experiences of the menstrual cycle in athletics</p>	<ol style="list-style-type: none"> 1) Compare differences in knowledge and communication of the menstrual cycle between junior and senior athletes. 2) Explore the coaching role and interaction between athletes in relation to the menstrual cycle. 3) Identify if different support or information is required for junior compared to senior athletes. 	<p>Physiology and Psychology</p>
<p>Biofeedback for Recovery</p>	<ol style="list-style-type: none"> 1) Understand athlete's motivations and perceptions of recovery. 2) Improve recovery strategy engagement. 3) Feedback to Sport Wales Institute on potential adaption to the recovery strategies. 4) Understand the recovery process from an athlete and coach's perspective to effectively implement a recovery intervention strategy. 	<p>Psychology</p>

SPOTLIGHT ON PROJECTS:

1. THE SWIMMING START: MEASUREMENT, IMPORTANCE AND ENHANCEMENT THROUGH PRE-RACE INTERVENTIONS

Project Contributors

Dr Helen Parrott (PhD student), Prof. Liam Kilduff (Swansea University), Prof. Neil Bezodis (Swansea University), Dr Ross Nicholas (Swim Wales), Spencer Fuge (Swim Wales).

Aims

This Swim Wales-funded project aimed to quantify the importance of the start to overall swim performance across a range of different strokes and distances, and then to investigate the potential efficacy of pre-race interventions which might enhance start performance.

Studies and Outcomes

The validity of the 'Nemo' system used by Swim Wales (and British Swimming) to assess start performance (i.e. time to 15 m) was first assessed, and then a large historical database of high-performance data (12,950 races from 2010-2019) were accessed to determine the importance of the start. Start times accounted for between 26.1% (female 50 m backstroke) and 0.7% (male 1500 m freestyle) of total race time. There were significant interactions with sex (males had faster absolute start times and these were a lower percentage contribution to total race time compared with females), time of day (faster in evening than morning, irrespective of heats/finals), and competition level (faster in Olympic Games, Commonwealth Games and World Championships than other national competitions).

As the time-of-day effect raised questions around preparation strategies, pre-race intervention strategies related to post-activation potentiation (PAP) and active heating post warm-up were then experimentally investigated.

14 national-level swimmers underwent ballistic and isometric PAP conditioning activities prior to completing maximal effort 20 m swims, and countermovement jump (CMJ) performance was also measured on a force platform pre-PAP intervention and immediately pre-swim. There were no significant group-wide main effects on swim start performance, but the ballistic PAP did lead to significant improvements in CMJ performance compared with the control immediately pre-swim (6.6% increase in height, 4.0% increase in peak power). Analysis of individual responses suggested that different swimmers responded differently each PAP condition, and individual-specific PAP strategies should also be explored during competition preparation.

The final experimental study used active (wire-heater based) and passive (foil-lined jacket) heat maintenance garments post warm-up (compared against a control in typical post-warm-up clothing), prior to a maximal effort 20 m swim, with CMJs again used to assess neuromuscular output. There were no effects of condition on any start time performance measures, but the passive heat maintenance garments lead to a significantly greater peak power output than control. Individual responses again differed, and further work to familiarise athletes with different options and identify preferred individual strategies was proposed.

Impact

Coaches have been able to understand the potential benefits of these strategies for different athletes and to integrate them, or adaptations of them, into their pre-race preparation strategies.

2. WELSH INJURY SURVEILLANCE IN GIRL'S YOUTH RUGBY (WISGYR)

Project Contributors

Dr Julian Owen (Project Lead), Dr Vicky Gottwald, Dr Seren Evans, and Eloise Kirby (Bangor University). The WISGYR project is a 3-year research study funded by World Rugby and supported by the Welsh Rugby Union (WRU).

Aims

The WISGYR project is one of the first research studies worldwide to address the lack of injury risk information available in youth female rugby, specifically in the community game. Most previous research focuses on male rugby populations, across international and professional settings. However, preliminary evidence suggests that the most common injuries and their severity for women in sport may be different to males and warrants further investigation. Over 3 years, we will be recording injuries in girls' rugby matches to assess risk. We will be collecting this information in girls aged between 7 and 18 years old from the WRU girls' hubs, secondary school games and local clubs in the North Wales region and aim to recruit 500-700 players.

Outcomes

Accurate injury records can: a) lead to a safer game via better understanding; b) allow governing bodies to change the structure of competitions to improve player safety; c) provide peace of mind for parents and players; and d) increase longevity of youth rugby careers and participation across community clubs. The WRU and the North Wales region will be at the cutting edge of making the game safer for girls at grassroots level.

Impact

To make the game of rugby safer and by putting the player first, we hope to identify welfare risks to young female players, investigate ways to reduce these risks and develop and share best practice guidelines.

For project updates, follow @WISGYR and see <https://www.bangor.ac.uk/wisgyr>.
#Hergame #Hersafety #Eigêrn #Eidiogelwch



3. THE WELLBEING AND MENTAL HEALTH OF ELITE ATHLETES: A COLLECTIVE CASE STUDY

Project Contributors

Dr Georgia Brown, Dr Denise M Hill, and Professor Camilla Knight (Swansea University) and Sport Wales Psychology Team.

Aims

Since the Duty of Care in Sport Report was released in 2017 by Dame Tanni Gray-Thompson, there has been an increasing spotlight on the wellbeing and mental health of athletes in the UK. This report, and subsequent empirical evidence has highlighted that performance athletes are at risk of low wellbeing and poor mental health, at a rate that is at least comparable to that of the general population. Indeed, when exposed to certain stressors (e.g., injury, failure, personal / sporting transitions, uncertain financial support, weight cutting for events, and interpersonal conflict) it appears that the risk to their wellbeing and mental health increases further.

However, to provide targeted and effective support for performance athletes, there is a need to understand in detail the complex and dynamic individual, environmental, and cultural factors that affect their wellbeing and mental health, as they transition through the performance pathway.

Hence, this longitudinal project utilised an ecological perspective, to capture, explore, and understand the key factors that affect the wellbeing and mental health of performance athletes within Welsh Judo and Welsh Cycling. In turn, this information was utilised to design, implement, and evaluate a targeted intervention that supported and protected the performance athletes' wellbeing and mental health.

Outcome

The key factors found to impact the wellbeing and mental health of the performance athletes included: (i) trusting relationships (i.e., whether high-quality relationships existed with coaches, teammates, family, and support staff); (ii) perceptions of self (i.e., body image, weight management / cutting strategies, and athletic identity); (iii) attitudinal changes towards wellbeing and mental health (i.e., extent of mental health literacy and culture of openness); and (iv) the resource pool (i.e., individual coping skills). Whether these factors had a positive or negative impact on the athlete was determined by their personal characteristics, specific context (i.e., immediate and remote environments), and time (i.e., stage of their competition cycle and career).

This information then informed a targeted, theoretically informed, evidence based, multi-level intervention that was designed to support and protect the athletes' wellbeing and mental. It consisted of an educational podcast series, infographics, and recommendations for the coaches to implement within their sporting environment.

Impact

The intervention, delivered through an 8 month period, was perceived to protect the athletes' wellbeing and mental health, and increase their confidence in seeking help for any wellbeing and mental health concerns that may arise. The podcasts were deemed particularly effective, as the information they contained was helpful, easy to access, and afforded the athletes ownership of their wellbeing and mental health needs. These resources are currently being utilised by Welsh Judo and Cycling and have been disseminated for use across all the Welsh sporting governing bodies.



HOW WIPS PROJECTS WORK



THANK-YOU TO THE RESEARCH STEERING GROUP MEMBERS FOR THEIR CONTRIBUTIONS

Professor Neil Bezodis (Biomechanics Lead)

Professor of biomechanics, Swansea University.

Kath Brown (Co-Chair RSG) Nutritionist, Sport Wales (position formerly held by Brian Hughes).

Dr Richard Burden (UKSI Representative)

Lead for Female Athlete Health & Performance and Bioscience Programmes, UK Institute of Sport.

Professor Brendan Cropley

(Coaching Science Lead) Professor of Sport Coaching, University of South Wales.

Dr Ryan Chambers (WRU Representative)

Sport Scientist for Welsh Rugby Union.

Dr Malcolm Fairweather

(SIS representative) Head of Performance Solutions, Sport Scotland Institute of Sport.

Andrew Sommerville (SIS Representative)

Senior Performance Physiologist, Sport Scotland Institute of Sport.

Dr Declan Gamble (SNISI Representative)

Head of Performance Science, Sport Northern Ireland Sports Institute.

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Dr Denise Hill (Athlete Health and Wellbeing

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Professor Liam Kilduff (Co-chair RSG)

Professor in Performance Science, Swansea University.

Professor Camilla Knight (Athlete

Environments Lead) Professor in Sport Psychology and Youth Sport, Swansea University.

David Lasini (SNISI representative)

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Dr Rhodri Martin (Medicine Lead) Sport and Exercise Medicine Consultant, Sport Wales.

Professor Jon Oliver (Strength and Conditioning Lead) Professor in Applied Paediatric Exercise Science, Cardiff

Metropolitan University.

Dr Sam Oliver (Extreme Physiology Lead)

A Professor in Sport & Exercise Science at Bangor University.

Dr Tom Poulson (Disability Sport Lead)

Head of Paralympic Performance Support, English Institute of Sport.

Dr Liba Sheeran (Sports Physiotherapy Lead)

Reader in Physiotherapy, Cardiff University.

Professor David Shearer (Psychology Lead)

Professor of Elite Performance Psychology, University of South Wales.

Dr Mark Waldron (Performance Physiology

Lead) Senior Lecturer in Sport and Exercise Sciences, Swansea University.

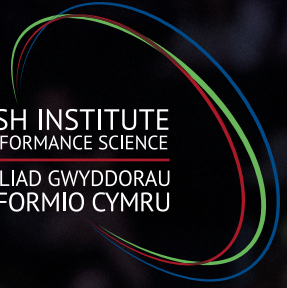
And the outstanding Research Associates (who do all the hard work on the projects!):

- **Dr Natalie Brown**
- **Dr Dan Cunningham**
- **Dr Alan McKay**

If you would be interested in connecting with any of the research steering group members or learning more about their research, please contact us at: WIPS@swansea.ac.uk and we will be more than happy to connect you.



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