Institution: The University of Stirling

Unit of Assessment: C26 Sport and Exercise Sciences, Leisure and Tourism

a. Overview

Scotland's University for Sporting Excellence, Stirling leads sport research in Scotland and is a significant contributor to sport research internationally. Research within the School of Sport is encapsulated within the theme of *developing excellence in sport, exercise and health.* The objective of our research is to drive understanding of how excellence in sport, exercise and health can be developed by focusing on athletes, coaches, organisations and society. We have a multi-disciplinary focus to our research and have expertise in areas as diverse as capacity building, gene marking, athlete transition, fish oils and athlete burnout.

Our research is organised into three strands:

- Sport Management: Leigh Robinson (Director), Joe Bradley, Paul Dimeo, Joyce Kay, Brian Minikin, Stephen Morrow, Nicolas Scelles, John Taylor and Mathieu Winand.
- Psychology of Sport, Exercise and Health: Bob Eklund (Director) Calum Arthur, Pete Coffee, Trish Gorely and David Lavallee (Head of School).
- Health and Exercise Sciences: Kevin Tipton (Director), Naomi Brooks, Iain Gallagher, Stuart Galloway, Lee Hamilton, Angus Hunter, Colin Moran, Ian Walshe and Oliver Witard.

Administration: The Head of School has responsibility for research and is supported by the Director of Research and the strand Directors. Research is a standing item on the agenda of the School's Executive meetings and all research active staff attend an annual Research Away Day. The School's Research Committee meets three times a year in order to discuss research policy, research progress and future strategy.

The School is supported administratively by the School Manager and a dedicated Research Development Manager from the University's Research & Enterprise Office. They have specific responsibility for supporting research bids and helping promote engagement with internal and external stakeholders. The School's Research Ethics Committee, chaired by Hunter and including lay members, monitors the conduct of all staff and student research against research ethics frameworks of the ESRC and reports to the University Ethics Committee.

b. Research strategy

In response to a rapidly changing context, the 2008 RAE submission set out a commitment to expansion in the area of sport science and an intention to move into the area of international sport management, which signalled a change in strategic direction for the research of the School. Goals were to increase research income, research students and to develop strategic research partnerships with both the academic and private sectors. Our strategy over this REF period has been to deliver this commitment and the School, backed by over £20 million of university investment, has achieved all of these goals.

Key highlights:

- The School has taken a strategic decision to refocus its research areas to reflect funding priorities and student choice and has sustained and developed new areas of excellence in the fields of sport management, exercise nutrition and psychology of sport, exercise and health.
- The number of research active staff returned in this assessment has nearly doubled from

11.6 in 2008 to 22.4 in 2014.

- Annual research income has more than trebled over the period (£96,400 in 2008-09; £335,500 in 2012-13).
- On-going strategic research partnerships, characterised by sustained funding of multiple research projects, have increased from two in 2008 (UK Sport and sportscotland) to eight in 2014 (Olympic Solidarity, the World Anti Doping Agency (WADA), GlaxoSmithKline, Scottish Institute of Sport, The Robertson Trust, Sporting Chance, North Lanarkshire Council and the Scottish Football Association.
- Commitment to research in Health and Exercise Sciences has led to a £3 million investment in facilities over this REF period.
- Research postgraduate completions have increased by 50% during the REF period and enrolments have doubled.

The University has substantially supported the expansion of the School's research active staff since the last RAE with academic staff numbers increasing from 11.6 to 24.4 FTE. Since the last RAE, the School has revised its research priorities in order to reflect student demand and STEM funding priorities. This led to professorial appointments to build research expertise in the areas of Sport Management (Robinson) and Psychology of Sport, Exercise and Health (Eklund) and to build capacity in the area of Health and Exercise Sciences (Tipton). These professorial appointments have been supported by the appointment of six lecturers in Health and Exercise Sciences, a senior lecturer and two lecturers in the Psychology of Sport, Exercise and Health and three lecturers in Sport Management. The substantial increase in staffing in the Health and Exercise Science area reflects the priority currently given to STEM subjects by government and funding agencies and supports the university's investment in the Health and Exercise Science laboratories (see below). Of particular importance in continuing to deliver cutting edge research has been the investment in researchers from mainstream disciplines who are now applying their expertise to sport. The application of the work of Brooks, Gallagher, Hamilton and Moran with genes and animal muscle to a sporting context will lead to mechanistic insights that will increasingly be applied to humans.

As a consequence, the School can legitimately claim to be leading research in its priority areas. For example, Lavallee's work with athlete lifestyle transitions underpins the athlete lifestyle support systems of the UK and Ireland. His work in The Republic of Ireland has been particularly significant and the programme developed on the basis of his research has supported 219 athletes across 24 sports. Research carried out by Robinson and Minikin in the area of capacity building has changed traditional expectations of the planning process to be followed by National Governing Bodies and has led Olympic Solidarity to disseminate their research technique to all 204 National Olympic Committees. Tipton, Galloway, Moran and Witard's work with fish oil is in collaboration with external partners including Glasgow Health Solutions, Ideal Omega, Diabetes Research and Wellness Foundation, and SmartFish Norway. This has developed knowledge about the ability and potential of muscle to use proteins to grow and is developing understanding of how this can be used for therapeutic purposes.

The university's investment, particularly that in new areas of research (i.e capacity building, athlete burnout, fish oils, sedentary behaviour, and transformational leadership) has provided a strong underpinning for the quality of research in the School. Going forward, this will allow the School to:

- carry out research that continues to shape our research disciplines, driving forward original knowledge as will be evidenced by the quality of outputs and the impact of our research;
- build research grant income sustainability above our subject area average by having a mixed economy of funding which comes from RCUK, policy agencies and sport organisations;

- increase research postgraduates per academic FTE by raising the profile of our research through dissemination and impact and by providing more support to PhD applicants, particularly in developing their proposals for funding.

These objectives form the basis of Personal Research Plans, which ask each member of staff to set out how they will contribute to their success. The achievement of Personal Research Plans are then monitored and evaluated via the University's *Achieving Success* appraisal process. To assist with the achievement of research objectives, the School's administrative and technical staff provide support where necessary.

c. People, including:

i. Staffing strategy and staff development

The demographic profile of the School has changed substantially since the 2008 RAE. No member of research staff is automatically eligible for retirement within the next 15 years, which provides a strong basis for continuity and stability within the School. A number of staff have been appointed from institutions outside Scotland (Tipton, Robinson, Lavallee, Eklund, Allan, Gorley, Witard, Winand, Coffee, Brooks, Scelles, Minikin and Hamilton) which has effectively increased the international networks open to the School. All research staff are expected to research and publish and are supported according to their needs and career status.

There has been a significant increase in the number of early career researchers over the REF period (three in 2008 and 12 in 2013) who are supported and mentored by senior staff. Mentors help with reading drafts, advising on suitable publication outlets and assisting with the preparation of research funding applications.

The School has an explicit Early Career Researcher (ECR) Support strategy which sets out how ECRs should prioritise high quality publications and develop research that creates impact as this contributes to the School's Research Strategy. In support, ECR have reduced teaching and administrative loads in order to build their research profile. As a consequence, all School ECRs have submitted research grant applications since their employment at Stirling and all are returned in this submission. The School actively supports participation in networking programmes such as Scottish Crucible. In addition, supported by an experienced colleague, ECR staff supervise post graduate research students to allow them to develop experience of research supervision.

To support all research, staff are eligible for research leave every six semesters (pro-rata for part time staff). Staff meet regularly with the Head of School and Director of Research to discuss research progress against targets which reflect the Research Strategy and are incorporated into the School's plan and monitored through *Achieving Success*. Staff are funded to present papers at conferences and in this REF period, all eligible research staff have had a minimum of six months research leave, primarily to focus on improving the quality of their research output and to develop major grant proposals. Part time staff are supported in the same manner as full time staff, with appropriate adjustments being made to their objectives to reflect their contract.

In line with the University's commitment to the Concordat to Support the Career Development of Researchers, research staff have access to the Researchers' Development Programme or a drop-in service for research support. This service is available to research staff at any stage of their career. There is also a dedicated researcher's area on the Careers Development Centre website: http://www.careers.stir.ac.uk/research/. The University has a Code for Good Research Practice which covers issues in relation to support and career development for research staff. The

principles set out in the Concordat are firmly embedded in the recruitment, support and development policies that the School follows and are, in part, responsible for the thriving culture of research within the School.

The School's research ethics policy uses the ESRC framework as its fundamental code of practice. The School Research Ethics Committee reviews all research involving human participants to ensure that their dignity, rights and welfare are protected. The committee meets every three months to consider applications from all students and staff carrying out research, although there is a 'fast-track' mechanism for essential applications that fall outside of the scheduled meeting times. Researchers seeking ethics approval complete an electronic request form, which is considered, approved or referred by the committee. Referred applications are advised of the changes necessary for approval and invited to resubmit. The School does not carry out research on non-human subjects and no research can commence without approval from the committee. The School committee is required to report regularly to the University Ethics Committee, which scrutinises decisions made and advises on best practice.

ii. Research students

Research student recruitment has increased over the REF period as indicated by the table below. The increase in PhD registrations has come about because of a strategic decision to provide university funding to support PGR. Thus, funding of PhD students comes from a number of sources. There are four university supported studentships; four studentships funded collaboratively by the university and industry (Elite Sport Analysis (2), Gaelic Athletics Association and GSK Nutritional Healthcare) while the remaining students hold scholarships from their own countries (Malaysia, Ghana, Egypt and Korea).

Table one: Doctor of Philosophy Sports Studies starting by year in the School of Sport

2008/09	8
2009/10	7
2010/11	8
2011/12	11.5
2012/13	17.5

Currently there are 27 PGR students within the School (17.5 doctoral students and 9.5 MPhil students), compared to 8 in 2008. Research student completions have exceeded the 6 completions of the last RAE period, with 8 PhD students and 5 MPhil students having graduated in this REF period. This increase in completions has been due to the improvements in support offered to PGR students over the assessment period, which includes a more systematic induction that establishes research training needs, more financial investment in data collection and greater access to research training. Following the acceptance of a 2000 word proposal that sets out the intended research, PhD students are supported and monitored by two supervisors who have responsibility for research training and research progression. Progression is determined annually by both supervisors and the Director of Research and is determined on the basis of the progress and quality of the student's research.

Discipline-specific training is offered within the School, with more generic transferable skills being developed as part of the Stirling Graduate School training programme. In conjunction with their supervisors, PGR students request further training relevant to their research development, which is funded by the School. All PGR students contribute to the School's research environment annually by presenting their research to staff and students and all final year students make presentations at

the University's Graduate School Research Day. PhD students assist with the mentoring of undergraduate and taught postgraduate students and with the running of tutorials and seminars. This not only allows them to share aspects of their research, but also to develop employability skills that will facilitate their future career. The School funds research students to attend conferences.

The quality of the research student environment is evidenced by a number of awards recently made to the School's PGR students. Chris McGlory won the 2012 New Investigator Award for the International Society for the Study of Fatty Acids and Lipids; Sophie Wardle's abstract 'Baseline Plasma MicroRNA Levels Differ Between Elite Endurance and Strength Athletes' was one of 10 abstracts selected from 400 to present at the 2012 International Biochemistry of Exercise Congress and Mikhail Batuev attended the postgraduate research session of the International Olympic Academy as the representative of the British Olympic Association.

d. Income, infrastructure and facilities

Research income has increased over this REF period, rising from £96,418 for 2008/9 to £335,541 for 2013/14, with a 59% increase in research income between 2010/11 and 2011/12. This sustained and substantial increase income is the result of a proactive and strategic approach to competing for grant income. Plans for obtaining research funding are set out in Personal Research Plans and monitored through *Achieving Success*. It is the aim of the School to build research grant income sustainability above our subject area average and we have set targets for research income that assist staff to exceed the industry benchmarks. The School's Research Development Manager in the Research and Enterprise Office works with the Director of Research and professorial staff to identify appropriate opportunities for research funding from charities and UK funding agencies. The School is on the preferred tender list for the Scottish Government and all staff proactively seek funding from the organisational networks that they have worked with. This has led to grants being obtained from a range of organisations including UK Sport (Hunter, £19700), Olympic Solidarity (Robinson, £55500), North Lanarkshire Council (Bradley £186000) Sports Leaders UK (Taylor, £15700) and the World Anti Doping Agency (Dimeo £26000).
Research grants are sought and won by staff both as individuals and as part of a team. For example, Dimeo was awarded an individual grant of £10,000 from the World Anti Doping Agency for investigating the history of doping in sport and in collaboration with colleagues from the School, was awarded £26,000 to investigate the whether being part of a team inhibits doping practices. In addition, staff within the School have achieved success with bids that have been submitted as part of a larger consortium, from within the University and outwith. For example, Robinson was Principal Investigator for a research projected funded by the Malaysian government (£100,000) that included researchers from within the School (Morrow), within the University (Sparkes, School of Management) and an external partner (Gratton, Sheffield Hallam University). This project was commissioned to develop the capacity of the Malaysian sport industry and involved five strands of research: an economic benchmark of the industry; an evaluation of the capacity of the Malaysian National Sport Organisations, an investigation into the funding of sport in Malaysia, Sport Retailing and the creation of a sponsorship structure for sport in Malaysia.

Staff in the School gain research awards via by competitive bidding. Particular highlights are the Fulbright Commission's Fellowship award to Dimeo to extend his work on the Doping of Elite Athletes (£8,250) and Hamilton's American College of Sports Medicine research endowment award (£6,370) to help to understand how resistance type exercises improves muscle mass. These awards, and others, fund and have funded research that has led to a number of high quality research outputs, such as the two articles by Hunter (2011, 2012) that emerged from research

funded by UK Sport, several by Galloway (2008, 2011, 2012) that are the result of funding from GSK and Lonza and Gorley's (2013, 2011) articles which resulted from research funded by Coca Cola.

The School has a mixed economy of research funding, with funding primarily coming from non-RCUK sources, such as Glaxosmithkline, Lonza, Chief Scientist's Office, British Academy, World Anti-Doping Agency, Scottish Football Association, Olympic Solidarity and the Malaysian government. Funding from UK central government bodies, local authorities and health and hospital authorities has grown over the last two years as has funding from UK industry. This is a consequence of the university's continued investment in staff with research expertise in physical activity and health (Gorely, Hamilton, Galloway). Although RCUK funding has been limited, reaching a high of £28,000 in 2012-13, all research staff are encouraged to submit bids to appropriate RCUK themes (currently nearly £1 million worth of bids submitted to RCUK). To assist with this, we have been investing in small research projects that have allowed staff to generate pilot data to inform large MRC and BBSRC research bids. The first of these will be submitted early in 2014.

In addition, during this REF period there has been major investment in the laboratory facilities located in the School, that are available for researchers in Health and Exercise Science. In 2010, after an investment of nearly £2 million, research labs were opened with the following: an exercise intervention laboratory, a body composition room with a DEXA scanner, a resistance training room, a muscle biopsy room, a nutrition laboratory and postgraduate and postdoctoral research centres. This has built the research capacity of the School significantly as this allows staff, research students and taught students to carry out exercise testing, muscle and blood analysis, resistance training, indirect calorimetry and measurements of body composition.

e. Collaboration and contribution to the discipline or research base

Collaborative research, a sign of being held in esteem by other academics, is a feature of the work of all staff included in the submission and is supported financially by the School. Staff are involved in collaborative research within and outwith the University, nationally and internationally (see previous examples of Dimeo and Robinson). Examples of the range of institutions involved in collaborations with the School include: Lithuanian Academy of Physical education (Moran); City University, New York (Dimeo); University of California (Hamilton); University of Capetown (Hunter) and University of Birmingham (Tipton). This diversity of collaboration within the School reflects the growing research reputation of the School both nationally and internationally.

Research collaboration takes a number of forms: it leads to research funding applications and research outputs (Brookes, Coffee, Dimeo, Eklund, Lavallee, Moran, Robinson, Scelles, Tipton and Winand) and research symposia. These collaborations provide the opportunity to extend the scope of the School's research activity and also offer the potential for innovative research projects of a much greater size to be pursued that would otherwise not be possible. For example, the research carried out in Malaysia, led by Robinson, led to collaboration with Sheffield Hallam University in order to carry out the economic benchmarking and with the Stirling Management School in order to evaluate the sport retailing market. Without these collaborations the review of the Malaysian sport industry would have been incomplete.

An additional example of collaborative working is the High Performance Sports Science and Sports Medicine facility, a £1.1 million development funded by the University and sportscotland and situated in the School's Sport Development Centre. The two new laboratories focus on elite sport performance and enable biomechanical analysis and performance assessment of athletes. Use of

the facilities is shared by the two institutions, embedding the ongoing partnership approach. In addition, the School works closely with the EU and Scottish Government funded 'Sporting Chance Initiative' support to Scottish small and medium-sized enterprises (SMEs) who are developing new products for sports markets or wish to explore how their existing products or technologies may be developed for sport. The Director of Research (Robinson) acts as the conduit between Sporting Chance and Scottish Universities in linking up potential new projects with research partners both in Stirling and in other institutions.

Staff make a more direct impact on their discipline by being active members of national and international academic networks and in many cases take on leading roles within these. For example, Robinson is a team leader in the MEMOS network – an international group of sport management researchers who provide advice, research support and training for the Olympic Movement. Her role as team leader allows her to shape policy and education around governance and strategic management in organisations that are part of the Olympic movement. Morrow is part of an academic network advising UEFA on financial fair play. Morrow has been involved in a series of workshops which have debated and defined the financial fair play regulations which have helped UEFA to clarify thinking on the topic; Winand is the Wallania-Brussels representative for the SPLISS (Sport Policy Factors Leading to International Sporting Success) consortium. This consortium is leading research investigating the factors that lead to elite sport success and Winand's role in this is to co-ordinate this research in the Wallania-Brussels region. The role that staff play in these networks provides the opportunity to shape thinking in research disciplines and contribute to emerging research agendas and professional practice.

Staff regularly make presentations to non-academic audiences, which disseminates the School's research and makes a significant contribution to public knowledge about sport. For example, Tipton has made presentations on sport nutrition to the Scottish Shellfish Growers Conference, the European Whey Producers associations and the Milk in Action Conference, while Witard has presented to dieticians and sports nutritionists at Nutritionists in Industry meetings. Lavallee has made public presentations to the Cheltenham Science Festival and the British Science festival. Staff are also active in the media. Moran has been interviewed by Euronews on the genetics of sport performance, Taylor contributed to a BBC Wales programme on Olympic Legacy; Robinson, Tipton and Lavallee have contributed to BBC programmes via a variety of media, while Morrow has contributed significantly and frequently to debates surround sport finance for a range of media, including News at Ten, BBC Breakfast News, BBC Radio 5 Live, BBC Radio 4, Newsnight Scotland, BBC Radio Scotland.

Other contributions to the research base and support of research activity include: Review of grants applications for funding agencies including the British Academy, Leverhume Trust, Scottish Crucible and ESRC; staff have examined 22 international PhDs in this REF period. The School is currently represented on a number of Editorial Boards: *Applied Physiology Nutrition and Metabolism; Managing Leisure: An International Journal; Sport Management Review; European Sport Management Quarterly; Leisure Studies; International Review of Sport and Exercise Psychology, International Journal of Sports Nutrition and Exercise Metabolism; Journal of Sports Sciences; Sport in History; Sport in Society; The Sport Psychologist; International Perspectives on Stress and Coping; Qualitative Research in Sport, Exercise and Health; Journal of Clinical Sport Psychology; Sport and Exercise Psychology Review; International Journal of Sport Finance; Journal of Sport and Exercise Psychology; Sport, Exercise and Performance Psychology; Sports Medicine.*