Application for Physiology Accreditation

July 2011

Contents

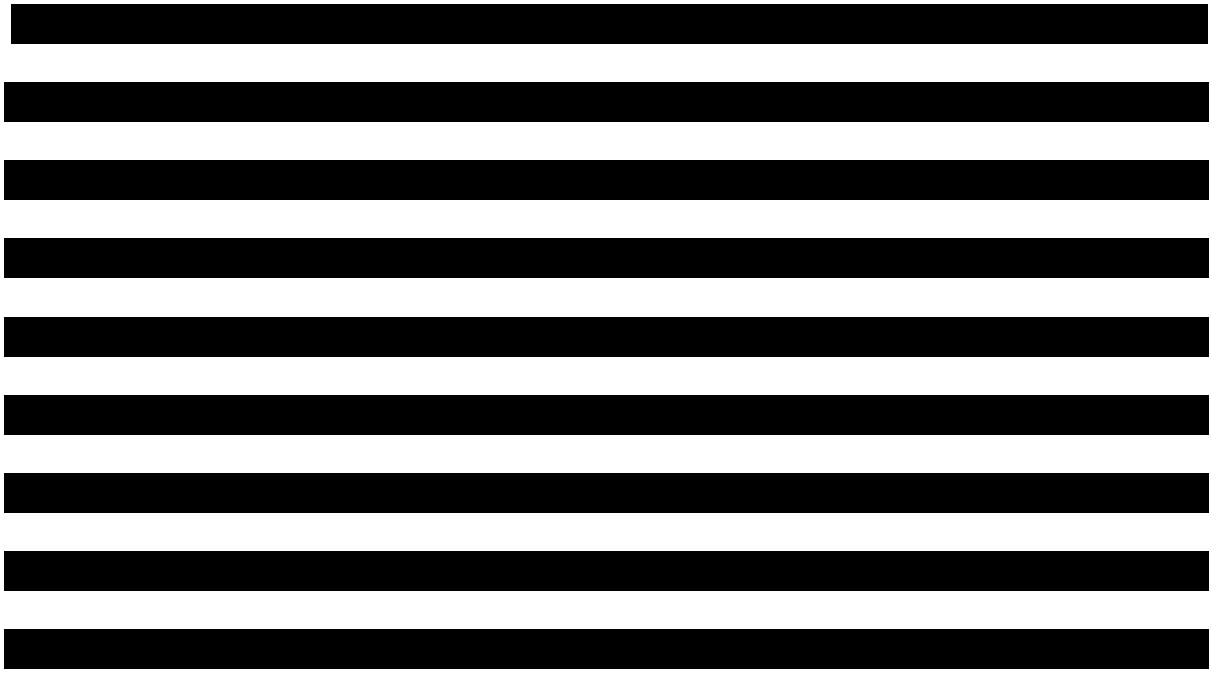
Accreditation Case Study

The case

The two elite female endurance cyclists in this case study are currently part of the Great Britain cycling team, and compete in both road and track racing events throughout the year. During the months of October to April the focus of their training and competition is women's 3km team pursuit, and from May to September they then focus on competing in national and international road races.

Table 1 Athlete Profiles

	Age (years)	Height (cm)	Body Mass (kg)	Years training/competing at national & international level
Athlete 1	18	169.6	65.7	4
Athlete 2	19	167.5	59.4	4



[redacted] The aim of monitoring their physiological status was to provide the athletes and coach with feedback on how successful the current training programme was in developing their performance in the Olympic discipline of women's team pursuit. I was approached to lead this project, which began in October 2009 following the completion of the road racing season, which coincided with the start of the track racing season.

Needs Analysis

Event Demands

Prior to designing a battery of tests to assess the athletes' performance at varying points in the racing calendar, it was first necessary to establish the determinants of performance in each of the events the athletes race in. Both athletes are required to compete in both road and track endurance races, performed on a variety of surfaces, combining extremes of exercise duration, intensity and frequency (Jeukendrup, Craig & Hawley 2000). Road racing is undertaken at submaximal power outputs, with races varying in duration from 5 min to stage races lasting 3 weeks (Jeukendrup, Craig, & Hawley 2000). Shorter track events require the cyclist to maximally tax both the aerobic and anaerobic metabolic pathways (Craig & Norton 2001).

Women's Team Pursuit

The athletes in this case study focus on the women's team pursuit event during their winter training phase, research exploring the cadence and power generated during women's track endurance events has not yet been investigated in the literature. It was therefore necessary to investigate the demands of this event prior to designing the intervention. The women's team

pursuit takes place on an indoor velodrome over 3km on a fixed gear bicycle. Depending on the race strategy it is likely that each athlete will complete one lap of the velodrome (250m) at the front of the line of riders before moving to the back of the line, and then working their way back to the front. In order to understand the physiological demands of the race, a power measuring device was fitted to the athlete's bicycle during a competition. As can be seen in figure 1, the power required to maintain a constant speed fluctuates above and below maximum minute power depending on the riders' position in the line. Also highlighted in figure 1 is a large peak in power (labelled standing start), which is needed to accelerate the rider mass and their bike from a standing start position on a fixed gear bicycle. This allows the rider to accelerate up to the speed required to maintain a certain pacing strategy as quickly as possible. Each rider will complete 4 laps over the 3 km (12 laps) distance in each position.

Figure 1 Power trace of a women's team pursuit using a SRM power meter, demonstrating the fluctuations in the power requirement of each position in the team. Position 1 is at the front of the line of riders, position 3 is at the back of the team, and position 2 is in the middle of 2 riders.

Road Cycling

Research conducted by Ebert et al. (2005) describes the power output generated by elite female road cyclists on both a hilly and flat terrain. When compared to hilly, flat terrains were raced at a similar cadence of 75 ± 8 vs. 75 ± 4 revolutions per minute (rpm). Flat races required the riders to spend significantly more time above 500 W, while more race time was spent between 100 – 300 W for hilly races. When compared to the women's team pursuit event, road racing requires the athletes to produce power aerobically for long periods of time (3-5

hours), in comparison a women's team pursuit which takes approximately 03:25 mins requires the athletes to maximally tax both their aerobic and anaerobic capacity.

Determinants of Performance

Determinants of successful road and track cycling performance include a complex interaction of many physiological variables including maximal oxygen uptake ($\dot{V}O_{2\,max}$), economy of movement, and gross mechanical efficiency, as well as environmental and mechanical variables (Jeukendrup, Craig & Hawley 2000). Collectively these variables enable greater ATP yield of energy via oxidative phosphorylation, therefore allowing sustained muscular contraction for tolerance of prolonged exercise. Craig et al (1993) reported that lactate transition thresholds are the most important factors in endurance track events, as well as road events. The production and removal of lactic acid from the muscle during exercise is a fundamental component of endurance performance, particularly during road racing where the intensity of exercise changes depending on the terrain or pace set by the leaders of the race. High efficiency, corresponding to low energy turnover is crucial for maximum endurance performance during cycling at high exercise intensities (Nielsen, Hansen, & Sjogaard 2004).

Pedalling rate has also been widely accepted as an important factor affecting cycling performance (Faria, Parker, & Faria 2005), and research utilising male participants of varying cycling ability have investigated the effect of pedalling rate on performance in road racing (Umberger, Gerritsen & Martin 2006; Nielsen, Hansen, & Sjogaard 2004; Chavarren & Calbet 1999; Hagberg, Mullin, Giese & Spitznagel 1981). Sargeant (1994) illustrated with a model of muscle-force velocity properties, that to generate a given power output the optimal pedalling rate should shift to higher pedalling rates as power output increases. [redacted]

[redacted]

Underpinning technical/theoretical rationale for the intervention

The transition from road racing to track racing for both athletes takes place in a very short space of time, < 4 weeks, allowing little time to adapt to changes in terrain, power output, and pedalling rate necessary for successful performance in that event. To allow athletes to adapt to the physiological changes necessary, their training focuses on improving the determinants of performance for that event. During the transition period from road to track, the coach wanted to explore changes in any physiological variables that could be deemed key performance indicators for the women's team pursuit. This would assist the coach in assessing their athletes, and the effectiveness of their current training programme.

[redacted]

The agreed purpose of the physiological monitoring was to examine;

1. **Changes in physiological determinants of performance for 2 elite female endurance cyclists following both road and track specific endurance training.**

2. **Provide the coach with objective data on athletes' physiological status at key points in the competition season, and provide information on training response.**

3. **Put a physiological monitoring package in place for continued support following on from initial testing intervention.**

Following an assessment of the determinants of performance in both road racing and women's team pursuit, and taking into account the purpose of the intervention, the following parameters (table 2) were measured in baseline and post training testing;

Table 2 Battery of tests that will take place pre and post training, the measurements to be collected during testing, and their relevance to performance.

Test	**Parameters Measured**	**Relevance to Performance**
Sub-maximal Test	[redacted]	[redacted]
Ramp Test to Exhaustion	[redacted]	[redacted]
Sprint Test	[redacted]	[redacted]
2 min Performance Trial	[redacted]	[redacted]
Body	[redacted]	[redacted]

Composition	[redacted]	[redacted]

Testing Summary and Aims

1. **Develop the skills to build strong and sustainable relationships with coach and athlete.**
    - Without full coach and athlete buy in, it is extremely difficult to plan in monitoring sessions. Any time taken out of the athletes training needs to be well justified, and they need to trust the practitioner to complete the testing successfully.
2. **Develop understanding and experience of physiological profiling and prescription**
    - As a practitioner I recognise the importance of embarking on new methods of testing to ensure I am delivering an innovative testing service to elite athletes. In addition it is also necessary to develop my technical skills to ensure test results are valid and reliable.
3. **Develop understanding of the physiological adaptations that occur with training/rest. Integrate knowledge into practical methods of athlete preparation and performance.**
    - Part of my role as a practitioner is to educate coaches and athletes regarding the physiological adaptations that occur as a result of different training methods. This information can then be used to inform decisions about training programmes, the content of training sessions, and the recovery needed for physiological adaptations to occur. It is therefore essential that I understand the

scientific rationale behind the results of tests, and can then use this information in future planning meetings with coaches.

The intervention package

[redacted]

Standard pre- and post-test procedures

Prior to each testing session the athletes completed a 10 min warm up at a self selected pedalling rate, and at the end of each test participants completed 10 min of low intensity cycling. To reduce thermal stress and minimise water loss due to sweating, they were fan cooled throughout testing, and encouraged to consume fluid during rest periods.

All exercise was completed on a calibrated electronically baked cycle ergometer (Shoberer Resistance Mechanism, SRM, Germany). The ergometer geometry (seat height and handlebar position in relation to the crank centre, and crank length) were matched with the

athlete's bike, and remained constant throughout testing. The SRM power meter was zeroed before each test in accordance with the manufacturer's instructions. Heart rate (HR), power output (PO), and pedalling rate were recorded every 0.1s and transmitted to a computer through a serial cable. To maintain the desired power output during the maximal and sub-maximal tests, the SRM ergometer powermeter transmitted a frequency proportional to the torque and a frequency proportional to the angular velocity via a transmitter to a power control located on the ergometer. The power control was then responsible for controlling the eddy current brake once the signal was received (Gardner et al. 2003).

Pulmonary gas exchange was monitored breath by breath, participants breathed through a low deadspace (30 mL), low resistance mouthpiece and volume sensor, and wore a nose clip throughout. Gases were analysed for O_2 and CO_2 concentrations by a metabolic analyser (Oxycon Pro, Hoechberg, Germany). The analyser was calibrated prior to each test using gases of known concentration. Volume was calibrated according to the manufacturer's instructions using a 3L syringe.

Body mass was measured to the nearest 0.1 kg prior to testing. Skinfold thickness was measured at 8 sites (biceps, triceps, subscapular, iliac crest, superspinale, abdominal, thigh, and calf) using skinfold callipers (Harpenden, West Sussex, UK), and the sum of these measurements was then calculated as the total skinfold thickness.

Maximal exercise test

[redacted]

[redacted]

Submaximal exercise test

[redacted]

Performance Trial

[redacted]

[redacted]

Training Period

Baseline testing took place at the end of the athletes' road training season in November. Repeat testing took place 14 weeks after baseline testing to co-inside with the athletes main competition focus for the winter season in February.

The athletes training consisted of a minimum of three track specific training sessions per week, which were completed on a fixed wheel bicycle at an indoor velodrome. Total volume during this training period averaged [redacted] km per week, compared with an average of [redacted] km per week during the road training period which was completed prior to baseline testing.

Feedback Schedule

The athletes and coach asked that the feedback of results were provided as soon as possible after the test to assist in setting training zones for subsequent training sessions that week. Results were fed back to the athlete and coach within 1 day following the test, with training zones provided on the same day (see appendix 1 for an example of the feedback sheet provided to the athlete)

Data Analysis

6s Sprint

[redacted]

The resultant impact/outcome

A large amount of data was collected during the pre and post tests, and it was decided prior to testing that only a summary of the results would be presented back to the athlete to avoid any confusion, and to ensure that only the key messages were delivered. Below is a summary of the results that were presented.

Maximal Exercise Test

- Table 2 provides a summary of the test results for pre and post training.

[redacted]

Table 2 Individual data collected during the graded exercise test to exhaustion pre and post training

	$\dot{V}O_{2\,peak}$ (ml.kg^{-1}.min-^{1})		MMP(W)		HR_{max} (b.min^{-1})		bLa^{-}_{peak} (mmol.L^{-1})	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Athlete 1	[redacted]							
Athlete 2	[redacted]							

Parameters measured included peak oxygen uptake ($\dot{V}O_{2\,peak}$ ml.kg^{-1}.min^{-1}), maximum minute power over a 1 min period (MMP), maximum heart rate (HR_{max} b.min^{-1}), and peak blood lactate (bLa^{-}_{peak} mmol.L^{-1})

Submaximal Exercise Test

- As can be seen in figure 2, athlete 1 and 2 showed different physiological responses during their submaximal tests pre and post training.
- Athlete 1 showed a [redacted]
- Athlete 2 showed [redacted]

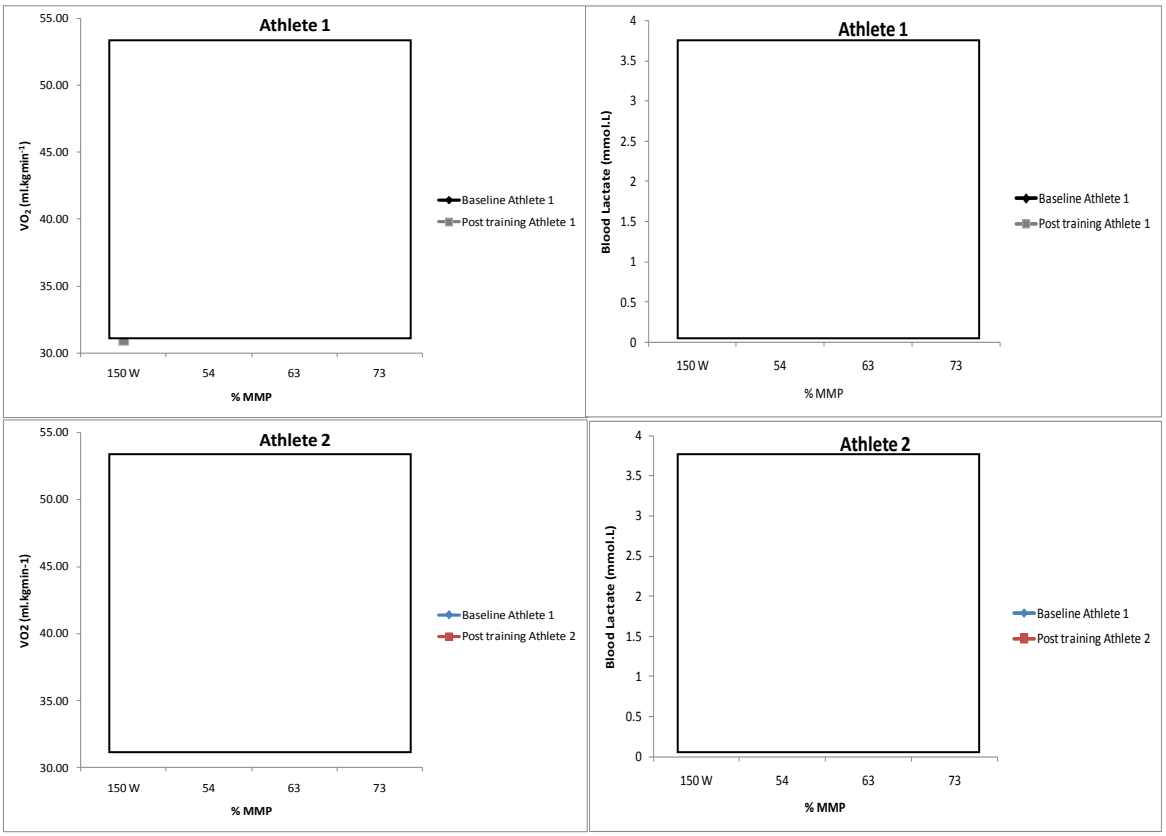


Figure 2 Individual data for athlete 1 (top 2 graphs) and athlete 2 (bottom 2 graphs) depicting oxygen uptake ($\dot{V}O_2$) and blood lactate (bLa^-) data pre and post training at 4 workloads ([redacted]).

Sprint Test

- As can be seen in table 3, athlete 2 [redacted].

Table 3 Individual data collected during a 6s sprint pre and post training

	PkPO (W)		T_{max} (Nm)		P_{max} (W)		Optimal PR (rpm)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Athlete 1	[redacted]							
Athlete 2	[redacted]							

Parameters measured include peak power (PkPO), maximum torque (T_{max}), maximum power (P_{max}) and optimal pedalling rate (Optimal PR). T_{max} represents the *y*-intercept of the torque-pedalling rate linear regression equation; P_{max} and optimal PR represent the power and velocity components of the apex of the parabolic power pedalling rate relationship.

Performance Trial

- Athlete 1 [redacted].
- Peak blood lactate [redacted].

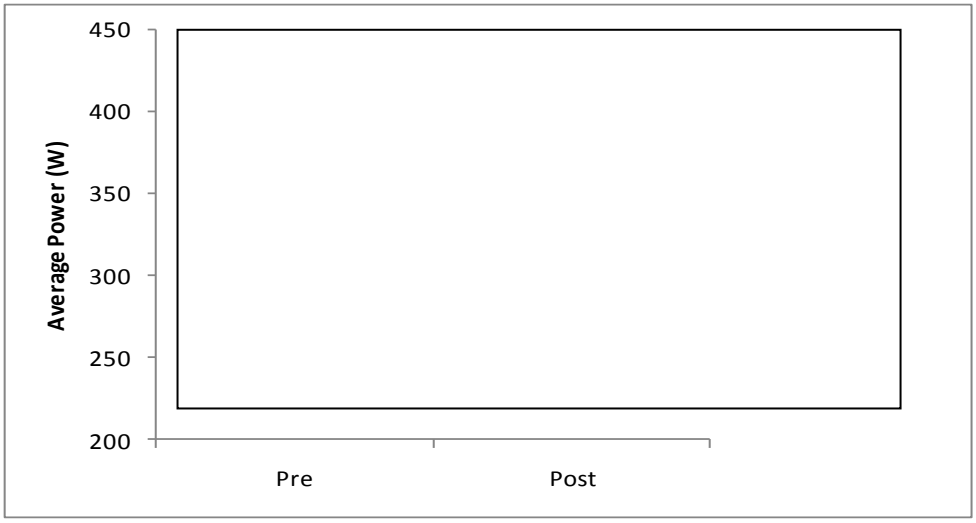


Figure 3 Average power obtained during the 2 min performance trial pre and post training for athlete 1 (solid blue line), and athlete 2 (solid red line).

Body Composition

- Athlete 1 and 2 had an increase in body mass of 2.4 kg and 1.2 kg respectively.
- SUM of 8 increased by 7.35 mm and 7.2 mm for athlete 1 and 2 respectively.
- Figure 3 below shows the distribution of skinfold thickness on the 8 sites measured for both athletes' pre and post training.

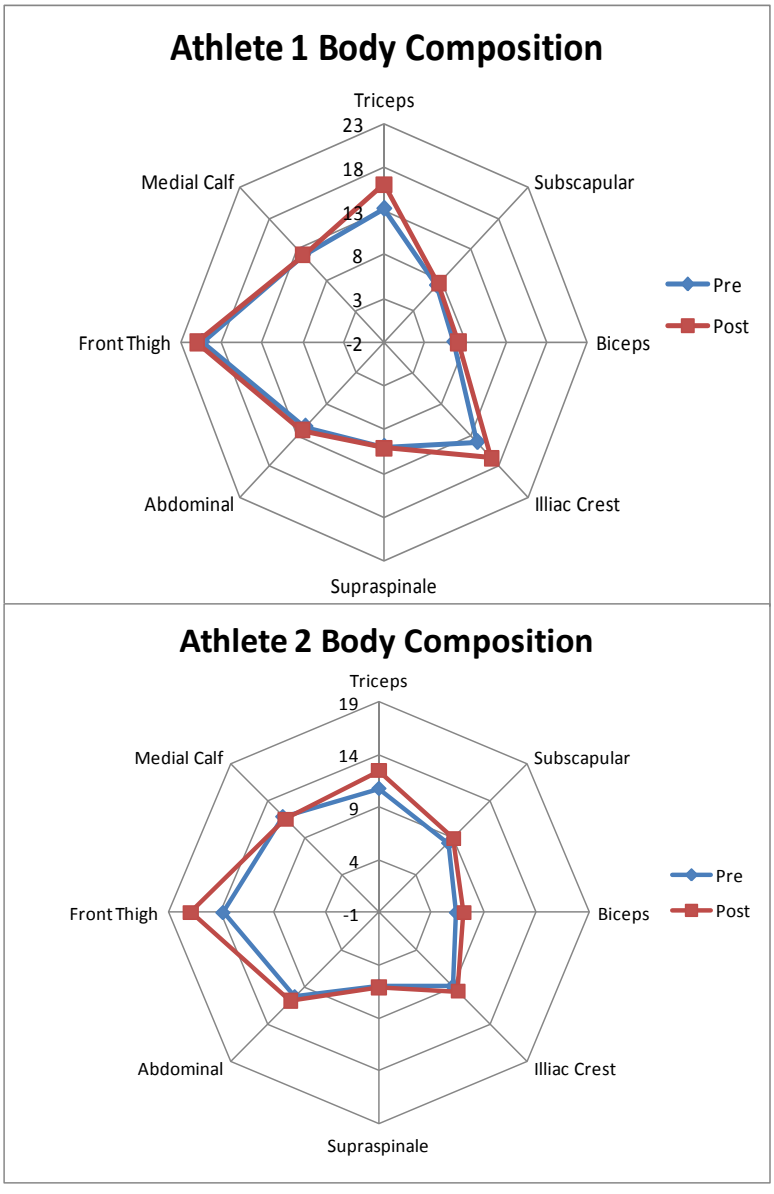


Figure 4 Distribution of skinfold measurements pre (blue solid line) and post (red solid line) training for athlete 1 and 2.

Summary of the results & outcome:

[redacted]

Personal reflection/evaluation of the process

- The goals set out before the intervention started were achieved. The coach and athlete were provided with objective information on changes in physiological determinants of performance following a specific block of track training.
- Feedback was delivered to the coach and athletes regarding their MMP and training zones on the same day of the test.
- It was highlighted by the athletes that they would have liked to have had information fed back to them on the submaximal test results at the same time. In future, expectations in regards to submaximal test information feedback will be set out before the intervention, as it would not be possible to analyse the data in a short time frame.
- The coach and athletes were happy with the support provided, and were keen to include this monitoring throughout the year.
- A thorough analysis of the power requirements for women's road racing and team pursuit ensured that the testing put in place was relevant to performance.
- There was a large time gap between tests, and although it is difficult to plan testing into training, it may be necessary to monitor the athletes more regularly. This would ensure that if [redacted] was decreasing over a track training period, an intervention could be put in place sooner.
- Although the laboratory measures provided objective data for the coach, it was suggested by the coach that it would have been useful to have a field based

measurement to go alongside this. I suggested that during future monitoring we could include a timed team pursuit at the velodrome.

- I successfully integrated with the coach and athletes within a short space of time through attending training sessions, and engaging the coach in discussion around the design of the testing intervention.

Appendix 1. Example of a feedback sheet

Physiological Test Results

Name: Athlete 1
DOB: [redacted]
Test Date: 10-Feb-2010
TestTime: 12:00

Anthropometry

Height (cm)	170.5
Mass (kg)	66.90

[redacted] Test

[redacted]

[redacted] Test [redacted]

[redacted] **Duration** [redacted]
Peak HR [redacted]
[redacted]

Zones	**Zone 1**	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**
Heart Rate	[redacted]					
Power (W)	[redacted]					

Development Plan

Practitioner's Name	[redacted]
Mentor	[redacted]
Date	08/05/09
Review Date (6 months)	N/A

The purpose of this document is to review the past 6 months of the internship using the 360° review, and to outline a 6 month development plan for the final 6 months of the internship.

1.0 Review

At the start of my internship, [redacted] and I agreed that developing my technical knowledge in relation to [redacted] should make up the most important part of my internship. Over the past 6 months I have developed my knowledge of cycling though exposure to cycling competitions and laboratory and field based assessments. Due to changes in structure within the North West physiology team, I am now running all endurance cycling laboratory based tests autonomously, which demonstrates a significant improvement in my technical knowledge of laboratory based cycling testing.

1.1 360° Review

An analysis of my professional strengths and weaknesses through a 360° review is summarized in figure 1. The review highlighted [redacted]

[redacted]

[redacted]

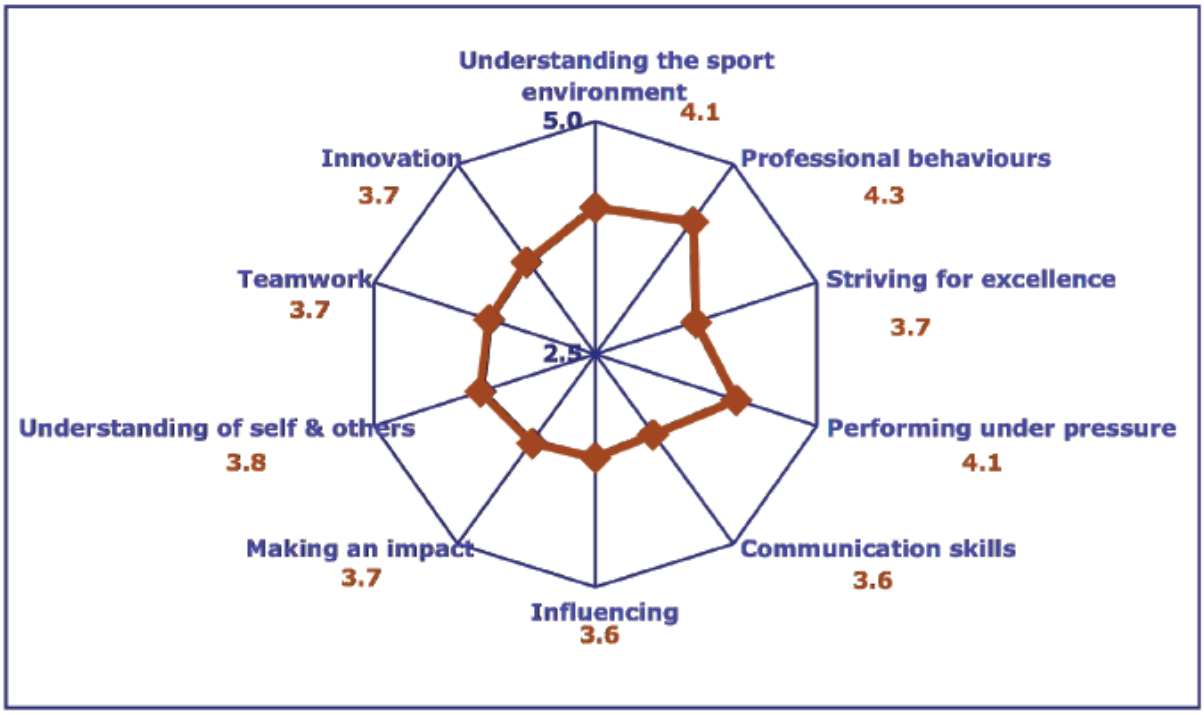


Figure 1. Profile category scores for 10 competencies based on a mean score from 5 respondents.

2.0 Continuous professional Development

During the 360° review meeting carried out with my mentor it was highlighted that during the final 6 months of my internship I need to focus on developing my technical knowledge and competence. This will assist in developing my relationships with coaches and athletes, as well as improving the impact I could have with the sport. Table 1 below outlines 6 continuous professional development activities, along with the learning outcome for each activity, the method of assessment for the learning outcome, and the competency being developed.

Competence	CPD activity	Learning Outcome	Assessment
Technical Knowledge	International Sports Science and Sports Medicine Conference 2009	Develop an understanding of the emerging areas of physiology in elite sport.	Written report of the major topics covered in the conference for distribution to North West physiologists including [redacted]. Specific areas of interest relating to cycling are to be researched further after the conference and included in the report.
Technical knowledge and innovation	Planning and commencement of MSc Dissertation	Development of a specific area of expertise within the cycling team. This will also allow me to develop a broad depth of knowledge in relation to women's endurance cycling through extended research.	Monthly meetings with Scott [redacted]r to assess the protocol being used for the study. Monthly correspondence with my dissertation tutor. Gain ethics approval from Manchester Metropolitan University. Final outcome will be assessed through the completion and submission of an MSc thesis.
Technical Competence and innovation	1 hour every 2 weeks using the SRM ergometer supervised by [redacted]	Develop a better understanding of how power output is measured in order to challenge current thinking regarding testing protocols.	Notes to be added to the PC list as necessary.
Technical Competence	Phlebotomy Training	Become proficient in obtaining a sample of venous blood.	Successful completion of the phlebotomy course and accreditation as a phlebotomist.
Technical Competence	Douglas bag system training	Part of my MSc dissertation testing will require use of the Douglas bag system. Douglas bag system training carried out by Cranlea will develop my skills using this piece of equipment allowing me to run testing autonously.	Successful completion of the training, with the ability to demonstrate how the equipment is used to other members of the physiology team. Write up PC notes for this piece of equipment and become product champion within the region.
Understanding the high performance environment	Attendance at camps and competitions. 1. Tour de l'aude (cycling competition) 2. U23 rowing camp (UK based training camp)	Providing physiology support to elite athletes to gain experience and understanding of the high performance environment. This will allow me to build relationships with coaches and athletes, which in turn will facilitate a successful needs analysis of that sport and discipline.	1. Tour de l'aude - morning monitoring to be completed each morning, and data presented to the coach and athletes before racing begins. Collection of power data using power tap wheels. Data is to be stored, and assessed alongside coaches back in the UK.Feedback to physiologists to be completed 4 weeks post competition 2. U23 rowing camp. Morning monitoring is to be completed, and data fed back to coaches, athletes, and senior physiologist at rowing.

Table 1. Proposed CPD activities to be completed in the final 6 months of the

internship.

It will be my responsibility to ensure that I make the most of each of these CPD activities and ensure that the assessment criteria are met. Monthly meetings with my mentor will also assist in reviewing my progress and tackling challenges that may arise throughout the next 6 months.

3.0 Major Challenges

3.1 [redacted]

[redacted]

[redacted]

3.2 Masters Degree

[redacted]

BRITISH ASSOCIATION OF SPORT AND EXERCISE SCIENCES

ACCREDITATION COMPETENCY PROFILE

Introduction

This document sets out the CASES **competencies** which are required for accreditation. These are the standards CASES has produced for the safe and effective practice of sport and exercise scientists. They are the minimum standards we consider necessary to protect members of the public.

You must meet these standards when you first become accredited. After that, every time you renew your accreditation you will be asked to sign a declaration that you continue to meet the standards of proficiency that apply to your practice within your domain of expertise.

Your domain of expertise is the area or areas of your profession in which you have the knowledge, skills and experience to practise lawfully, safely and effectively, in a way that meets our standards and does not pose any danger to the public or to yourself. We recognise that an accredited member's domain of expertise may change over time and that the practice of experienced members often becomes more focused and specialised than that of newly accredited colleagues. This might be because of specialisation in a certain area or with a particular client group, or a movement in roles in management, education or research.

Your particular domain of expertise may mean that you are unable to continue to demonstrate that you meet all of the standards that apply

As long as you make sure that you are practising safely and effectively within your given domain of expertise and do not practise in the areas where you are not proficient to do so, this will not be a problem. If you want to move outside of your domain of expertise you should be certain that you are capable of working lawfully, safely and effectively. This means that you need to exercise personal judgement by undertaking any necessary training and experience.

Meeting the standards

It is important that those accredited by CASES meet our standards and are able to practise lawfully, safely and effectively. However, we don't dictate how you should meet our standards. There is normally more than one way in which each standard can be met and the way in which you meet our standards might change over time because of improvements in technology or changes in your practice. As an autonomous professional you need to make informed, reasoned decisions about your practice to ensure that you meet the standards that apply to you. This includes seeking advice and support from education providers, employers, colleagues and others to ensure that the wellbeing of service users is safeguarded at all times.

Service users

We recognise that accredited members work in a range of different settings, which include applied practice in sport and health, education, research and roles in industry. We recognise that different professions sometimes use different terms to refer to those who use or who are affected by their practice and that the use of terminology can

be an emotive issue. We have tried to use a term in the generic standards which is as inclusive as possible. Throughout the generic standards we have used the term ‘service users’ to refer to anyone who uses or is affected by the services of accredited members. Who your service users are will depend on how and where you work. For example, if you work in applied practice, your service users might be your clients or your staff if you manage a team. The term also includes other people who might be affected by your practice, such as carers and relatives.

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

1 – Scientific Knowledge

Be able to demonstrate a detailed scientific knowledge and understanding relevant to the domain of expertise

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED
3a.1	• Know and understand the key concepts of the bodies of knowledge which are relevant to their professional specific practice	The completion of the following qualifications and publications provides evidence of scientific knowledge: • MSc Sport & Exercise Science Exercise Physiology at Manchester Metropolitan University (page 38) • BSc (Hons) Sport & Exercise Science Northumbria University • Publications, symposiums and workshops (page 5) • CPD Log (page 5-6)
3a.1	• Understand the structure and function of the human body relevant to their practice, together with knowledge of health, disease, disorder and dysfunction	
3a.1	• understand and be able to apply the theoretical concepts underpinning sport and exercise science delivery within their domain of expertise	
3a.1	• Understand the theoretical basis of, and the variety of approaches to, assessment and intervention	
3a.1	• Understand how sport and physical activity affect and influence the structure and function of the human body	
Examples of how this could be achieved:	• Evidence of a BUES sport and exercise science undergraduate degree • Evidence of a CASES recognised postgraduate qualification in sport and exercise science	

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

2 – Technical Skills

Be able to demonstrate full understanding and application of relevant scientific techniques

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED	
2a.1	• Be able to gather appropriate information via undertaking or arranging investigations as appropriate	BSc and MSc dissertation are examples of designing and carrying out investigations.	MSc Sport & Exercise Science (Exercise Physiology) at Manchester Metropolitan University (page 38) BSc (Hons) Sport & Exercise Science Northumbria University (page 39) Publications and Presentations: Page 5 of the portfolio.
2a.2	• Be able to select, undertake and record a thorough, sensitive and detailed assessment, using appropriate techniques and equipment	BSc and MSc dissertation are examples of designing and carrying out investigations.	
2a.4	• Be able to analyse and critically evaluate the information collected	Published research demonstrates my ability to critically evaluate information collected.	
2b.2	• Be able to demonstrate a level of skills in the use of information technology appropriate to their practice	Symposiums, presentations and written literature (page 5 of the portfolio), and feedback reports provided for athletes (pages 27 of the portfolio) are examples of different methods of technology used to convey information to different audiences	

2b.4	• Be able to conduct appropriate diagnostic or monitoring procedures, treatment, therapy or other actions safely and skilfully relevant to the domain of expertise	Accreditation case study demonstrates my ability to conduct several monitoring procedures in my domain of expertise.	
Examples of how this could be achieved:	• Evidence of CASES endorsed /recognised undergraduate and postgraduate degrees Certification from relevant recognised training courses • Case study/reflective accounts • Presentations at conferences and workshops	• Completion of laboratory manual or similar • Refereed publications • Presentations at conferences and workshops	

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

3 – Application of Knowledge and Skills

Ability to demonstrate the application of knowledge and technical skills to the relevant delivery environment

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED	
2c.1	• Be able to evaluate intervention plans using recognised outcome measures and revise the plans as necessary in conjunction with the service user	Case study and training camp support (Employment history, page 4) which is part of my job role are examples of this.	Part of my employment over the past 2.5 years has been to apply knowledge and skills to my working environment, both laboratory based and field based support. This has been used to carry out bespoke research projects and daily monitoring of athlete performance. Employment History, page 4. Case Study page 7-26. MSc Sport & Exercise Science (Exercise Physiology) at Manchester Metropolitan University (page 38).
2b.2	• Be able to draw on appropriate knowledge and skills in order to make professional judgements	MSc Sport & Exercise Science (Exercise Physiology)	
2b.3	• Be able to select, plan, implement and manage the appropriate sport and exercise science interventions aimed at helping the service user achieve the agreed goal	All testing and monitoring that takes part as part of my current role is focused on improving performance.	
2b.3	• To be able to set goals and construct specific individual and group sport and exercise science development programmes	Feedback reports generated for individual athletes based on testing interventions. Page 27 of the portfolio.	
2b.4	• Know and be able to apply the key concepts which are relevant to safe and effective practice within their domain of expertise as a sport and exercise scientist	Knowledge of the CASES code of conduct	
3a.1	• Understand and be able to apply the theoretical concepts underpinning sport and exercise science delivery within their domain of expertise	MSc Sport & Exercise Science (Exercise Physiology)	

Examples of how this could be achieved:	• Case study following CASES guidelines • Reflective accounts	• Research plan, ethics submission • Teaching plan, curriculum development

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

4 – Understanding and Use of Research

Be able to demonstrate a training in research which enables the understanding and application of research findings

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED	
2b.1	• Be able to use research, reasoning and problem-solving skills to determine appropriate actions	My current employment requires this approach on a daily basis to answer coaches' questions, and carry out research projects.	Part of my role as an applied sport science practitioner is to carry out bespoke research projects for [redacted]. Sound scientific principles applied to this approach, however the results of these projects are often not publishable to protect intellectual property of the sport, and maintain an advantage over competing nations. See employment history page 4 Publications and presentations page 5
2b.1	• To recognise the value of research to the critical evaluation of practice		
2b.1	• Be able to engage in evidence-based practice, evaluate practice systematically and participate in audit processes		
2b.1	• Be aware of a range of research methodologies	MSc Sport & Exercise Science (Exercise Physiology). Publications (page 5)	
2b.1	• Be able to use appropriate statistical and other research skills to gather and interpret evidence in order to make reasoned judgements with respect to sport and exercise science practice		
3a.1	• Be aware of the principles and applications of scientific enquiry, including the evaluation of effectiveness of practice and the research process		
Examples of how this could be achieved:	• Evidence of CASES endorsed / recognised undergraduate and postgraduate degree research studies/projects • Critique of published research papers • Research proposal • Literature review • Postgraduate dissertation	• Further research activity including published refereed papers/presentations at conferences or workshops • Returned in the RAE 2008 • Case study and intervention • Review how own research could impact on practice	

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

5 – Self Evaluation and Professional Development

Ability to self reflect, take responsibility for own actions, and to demonstrate that continuous professional development occurs

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED	
1a.6	• To be able to practice as an independent professional, exercising their professional judgement	I am currently responsible for all physiological support to the endurance squad of the Great Britain cycling team, this requires me to work independently, exercising my professional judgement where necessary to carry out monitoring or research projects.	The UK Sport Fast Track Practitioner Programme, which I completed in 2008/09, was heavily focused on self reflection and CPD. An example of this can be seen on pages 28-31 in the development plan that I put together with my mentor. The EIS also encourages self reflection though their appraisal process, areas for development are identified, and CPD is put in place to address this (see
2b.2 2c.2	• Be able to adapt their practice as a result of new and emerging ideas and information within the area of sport and exercise science	See CASES case study (page 7-26)	

2c.2	• Be able to maintain an appropriate audit trail and work towards continual improvement	I complete a daily audit through the EIS database, where I include every hour I work, what type of work it was, and if it was direct athlete support which athlete that was with. I also complete 6 monthly reviews with my manager to ensure continual development (see page 32-37).	pages 32-37)
2c.2	• Understand the value of reflection on practice and evidence of engagement in the process	See UK Sport FTPP Development plan and EIS appraisal documents.	
1a.8	• Understand the need to keep skills and knowledge up to date and the importance of career-long learning	See UK Sport FTPP Development plan and EIS appraisal documents.	
2c.2	• Understand the principles of quality control and quality assurance	Part of my current employment involves regular quality control checks of the equipment I use on a daily basis.	
Examples of how this could be achieved:	• Documented evidence of attendance of the required 4 mandatory and 2 optional CASES SE workshops • Documented evidence of all other courses run or attended • Case examples showing how practice has been adapted • Testimonials • Video evidence • Adherence to CASES Code of Conduct	• Reflective accounts maintained over the 2 years of supervised experience • Reflective accounts corresponding to own practice and case study meetings • Career development plan • Attendance at other workshops • Evidence based literature review • Peer review	

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

6 – Communication

Ability to communicate orally and in writing to colleagues, peers and clients

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED	
1b.3	• Be able to demonstrate effective and appropriate skills in communicating information, advice, instruction and professional opinion to colleagues and clients	CASES Symposium (see page 5), and case study which are examples of different ways to communicate information.	Several examples of different methods of communication can be seen in the following sections: • Publications, abstracts and conference proceedings (page 5) • CASES workshop delivery (page • 5) Athlete feedback sheet (page 27)
1b.3	• Be able to select, move between and use appropriate forms of verbal and non-verbal communication with service users and others	CASES Symposium (see page 5), and feedback report given to the athlete (page 27) are examples of two different ways of communicating information. As well as delivering the feedback sheet to an athlete, I also talk through the results with the athlete and coach and discuss further testing and monitoring or an intervention.	

1b.3	• Understand the need to provide service users (or people acting on their behalf) with the information necessary to enable them to make informed decisions	For each project that I lead on in my current employment I am required to produce a 1 page summary of the results and potential impact on performance, which are then available for coaches to read. This provides them with the information needed to inform decisions regarding the preparation of their athlete.	
1b.4	• Recognise the need to use interpersonal skills to encourage active participation of service users		
2b.2	• Be able to discuss and explain the rationale for, the use of sport and exercise science interventions	See CASES case study (pages 7-26). Without the buy in of the athlete and coach this intervention would not have taken place.	
1b.3	• Be aware of the characteristics and consequences of non-verbal communication and how this can be affected by culture, age, ethnicity, gender, religious beliefs, nationality, sexuality and socio-economic status	Both the UK Sport FTPP and my experience of working a high performance environment has highlighted the importance of non verbal communication.	
Examples of how this could be achieved:	• Documented evidence of attendance of the required 4 mandatory and 2 optional CASES SE workshops • Report from supervisor • Documented evidence of the presentation of information to different groups (peers, client groups etc) via different media (oral, written) • Delivery of a workshop • Video of delivery/communication • Assessing learning styles • Marketing materials	• Documented examples of written material such as client reports, scientific material • Case examples where your communication skills have influenced the outcome • Conferences, posters/presentations, scientific articles • Lectures, curricula and lecture notes • Evaluation forms • Peer and client review • Role play • Ability to translate scientific detail to the end user	

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

7 – Problem Solving and Impact

Ability to address problems in a scientific and evidence based manner which results in a positive and timely outcome

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED
2b.1	• Be able to demonstrate a logical and systematic approach to problem solving	Problem solving and impact are part of my roles and responsibilities as a practitioner working for a high performance sport. As part of a multidisciplinary team, we are often asked to solve performance problems through carrying out an analysis of the current literature and then either applying this knowledge to current performance, or carrying out research projects to create new knowledge. The CASES case study is an example of this (pages 7-26).
2c.1	• Be able to monitor and review the ongoing effectiveness of planned activity and modify it accordingly	
1a.6	• Be able to initiate resolution of problems and be able to exercise personal initiative	
2b.3	• Be able to apply problem solving and scientific reasoning to assessment findings to plan and prioritise appropriate expertise specific interventions	
2c.2	• Recognise the value of case conferences and other methods of review	
2c.1	• Be able to make reasoned decisions to initiate, continue, modify or cease treatment or the use of techniques or procedures and record the decisions and reasoning appropriately	
Examples of how this could be achieved:	• Case study examples demonstrating the approach taken to solving problems • Examples of reflective accounts on practice • Needs analysis	• Refereed publications • Presentations at conferences and workshops • Formal evaluation of teaching

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

8 – Management of Self, Others and Practice

Be able to demonstrate an understanding of management requirements and to mange self and others

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED	
1a.7	• Recognise the need for effective self-management of workload and resources and be able to practice accordingly	While working full time for British Cycling I also complete an MSc in sport and exercise science, which required me to manage my workload effectively to ensure I could complete both the MSc and my job roles to a high standard.	My employment history (page 4) provides evidence of being able to manage my own workload, maintain records and report back information, as well as working as part of a multi-disciplinary team.
1a.8	• Understand the obligation to maintain fitness to practice		
2b.5	• Be able to maintain records appropriately		
1b.2	• Be able to contribute effectively to work undertaken as part of a multi-disciplinary team	My current employment requires a close working relationship with several disciplines, is an example of working as part of a multi-disciplinary team.	

3a.3	• Understand the need to establish and maintain a safe practice environment	Knowledge of the CASES code of conduct and the EIS health and safety guidelines.	
1a.1	• Be aware of current UK legislation applicable to the work of their profession		
1a.6	• Recognise that they are personally responsible for and must be able to justify their decisions		
Examples of how this could be achieved:	• Documented evidence of attendance of the required 4 mandatory and 2 optional CASES SE workshops • Structured taught element of post graduate degree • Leading on projects • Risk assessment	• Attendance at relevant workshops and training days • Documented situations which demonstrate appropriate understanding • Team boundaries • Appropriate CPD activities	

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

9 – Understanding of the Delivery Environment

Be able to demonstrate a knowledge of and integration into, the specific delivery environment

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED	
3a.2	• Know how professional principles are expressed and translated into action through a number of different approaches to practice and how to select or modify approaches to meet the needs of an individual, groups or communities	The UK Sport FTPP focused on learning styles and personality types in several sessions. I often adapt the approach I am taking to a feedback session or to a testing situation depending on the athlete or coach I am working with.	My employment history (page 4) and experience demonstrate my understanding of the delivery environment.
1b.1	Understand the need to build and sustain professional relationships as both an independent practitioner and collaboratively as a member of a team	The CASES case study (pages 7-26) presented provides and example of the ability to develop relationships with athletes and coaches. Without an ongoing development of this relationship it would not be possible to continue to carry out interventions.	
1b.1	• Understand the structure and function of relevant services in the UK and current developments within which they operate; and be able to respond accordingly	My experience of working in the high performance environment in the UK has provided me with the knowledge of the structure and function of the services available.	

1b.3	• Recognise that relationships with service users should be based on mutual respect and trust, and be able to maintain high standards of case even in situations of personal incompatibility		
2b.3	• Understand the requirement to adapt practice to meet the needs of different groups distinguished by, for example, physical, psychological, environmental, cultural or socio-economic factors	I have worked with several different sports and athletes from different cultural and socio economic environments.(see employment history page 4)	
2b.3	Understand the need to agree the goals, priorities and methods of the proposed intervention in partnership with the service user	See CASES case study (pages 7-26) for an example of agreeing an intervention with a coach and 2 athletes.	
Examples of how this could be achieved:	• Feedback from clients • Letter of support • Voluntary work	• Case study which demonstrates understanding of and adaptation to the delivery environment • Examples from own practice	

EXPERIENCE: The candidate should be able to demonstrate that he/she has worked in an environment that has enabled the individual to receive training and gain experience relevant to the competences set out below.

10 – Professional Relationships and Behaviours

Be able to demonstrate adherence to the highest standard of ethical and professional behaviour and team work in working with colleagues and clients

HPC Standards of Proficiency Code	AREA OF COMPETENCE	INDICATE SECTION(S) IN PORTFOLIO WHERE COMPETENCE IS DEMONSTRATED	
1a.1	• Be able to practice within the legal and ethical boundaries of their profession	MSc dissertation was approved by an ethics committee, and I am aware of and practice the CASES code of conduct.	The attainment of ethical approval for published research and dissertations provides evidence that I work in a safe manner, and always have interests of the service user in mind when planning and carrying out any testing procedure.
1a.2	• Be able to practice in a non-discriminatory manner		
1a.3	• Understand the importance of and be able to maintain confidentiality	All athlete information is kept confidential unless permission from the athlete is confirmed.	
1a.4	• Understand the importance of and be able to obtain informed consent	Athletes are required to complete informed consent forms before any testing procedures. I have also gained informed consent for any research studies (see publications on page 5)	
1a.1/1a.5	• To be able to exercise a professional duty of care and to act in the best interests of service users at all times		
1b.1	• Be able to work, where appropriate, in partnership with other professionals, support staff, service users and their relatives and carers	This is part of my job role in my current employment.	

3a.3	• Be aware of applicable health and safety legislation, and any relevant safety policies and procedures in force in the workplace, such as incident reporting and be able to act in accordance with these	I am aware of all health and safety policies provided by the EIS.	
1a.6	• Know the limits of their practice and when to seek advice or refer to another professional	I am supervised by several experienced practitioners, which I seek advice from when necessary.	
Examples of how this could be achieved:	• Relevant taught elements of postgraduate degree • Examples of forms and records kept • Attendance at appropriate training days • Testimonials from service users	• Successful ethics submission • Case study examples of good practice • Consent forms	

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