

**SCHOOL OF SPORT SCIENCE, EXERCISE AND  
HEALTH**

---

**HONOURS PROJECTS  
2010**

---

**Biomechanics, Motor Control and Development**

**Exercise Physiology and Biochemistry**

**HEALTH BEHAVIOUR AND PERFORMANCE PSYCHOLOGY**

**PHYSICAL AND HEALTH EDUCATION**

**Exercise Rehabilitation or Occupational Safety and Health**

## Introduction to Honours

The Honours Research Degree at School of Sport Science, Exercise and Health is a prestigious one-year, research-based extension of your undergraduate degree that is available only to students who demonstrate academic excellence. During your Honours year, you will be required to complete three units and to spend most of your time on your research work and thesis. Irrespective of whether you are interested in undertaking a career in research, our Honours Research programme will allow you to develop a broad range of generic skills highly valued in the workforce, such as problem-solving and organisational skills, initiative, advanced computer skills and capacity to work independently and in a team. In this respect, the Honours degree is of great value for your career prospects as it distinguishes you from regular BSc graduates who would not have had the same opportunity for an advanced learning experience.

If you are interested in pursuing an Honours Research Degree, it is important that you determine the general area that you wish to study, and discuss potential research projects with staff in that area. It is important to stress that you are not required to define your own research project as most Honours projects are normally part of the supervisor's ongoing research. The School offers several research streams: Biomechanics, Motor Control and Development, Exercise Physiology and Biochemistry, Health Behaviour and Performance Psychology, Health and Physical Education and Exercise Rehabilitation/Occupational Safety and Health. In order to help you to find a project that suits you, we have compiled a list of some of the Honours research projects on offer for 2010.

If you wish to pursue this degree, you must initiate discussions with members of staff as soon as possible as limits on the number of available supervisors in a given year may prevent some eligible students from gaining entry. Once you have secured a potential supervisor, you will need to apply on-line through Student Connect. If you are successful, a formal invitation will be mailed to you in January 2010 by the Faculty.

It is important to note that in order to enrol in the Honours Research Degree offered by the School of Sport Science, Exercise and Health you must reach a grade point average of 65% and above across your third year units. For this reason, you should aim at performing exceptionally well at your final exams.

If you have any queries about our Honours program, please feel free to contact our Honours Coordinator, Prof Paul Fournier ((08) 6488 1356 or [fournier@cyllene.uwa.edu.au](mailto:fournier@cyllene.uwa.edu.au)) or Inga Carr (08) 6488 2360 or [inga.carr@uwa.edu.au](mailto:inga.carr@uwa.edu.au) .

## LIST OF HONOURS PROJECTS FOR 2010

### BIOMECHANICS, MOTOR CONTROL AND DEVELOPMENT

#### **WINTHROP PROFESSOR BRUCE ELLIOTT**

*If you wish to undertake your Honours project with Bruce Elliott, please do not hesitate to contact him on 6488 2374 or [Bruce.Elliott@uwa.edu.au](mailto:Bruce.Elliott@uwa.edu.au).*

#### **ASSISTANT PROFESSOR JACQUELINE ALDERSON**

*If you wish to undertake your Honours project with Jacqueline Alderson, please do not hesitate to contact her on 6488 5827 or [jalders@cyllene.uwa.edu.au](mailto:jalders@cyllene.uwa.edu.au)*

#### **MR NAT BENJANUVATRA**

##### **SWIMMING BIOMECHANICS / MOTOR LEARNING & CONTROL**

- Differences in skills relating to swimming technical fault detections between experienced and novice coaches & teachers: what do expert coaches see that novice coaches don't? (With Brendan Lay)
- Optimising swim start performance: the influence of lower limb strength and power.

##### **FUNCTIONAL ASYMMETRY PROJECTS**

- Biomechanical and functional differences between dominant and non-dominant lower limbs in different population groups (non-athletes, runners & football/soccer players)
- The influence of vision on symmetry in locomotion

*For more information, please do not hesitate to contact Nat on 6488 2437 or [natbenj@cyllene.uwa.edu.au](mailto:natbenj@cyllene.uwa.edu.au)*

### **ASSISTANT PROFESSOR BRENDAN LAY**

- Visual perceptual skills of experts compared to novices: sport specificity in visual cueing and decision making.
- Three-Dimensional Stereoscopic Stimulus to Examine Side-stepping for Risk of Anterior Cruciate Ligament Injury.
- The effect of prolonged walking on standing and walking balance in elderly women. Does 'finding 30' increase the risk of falling?

*For more information, please do not hesitate to contact Brendan Lay on 6488 8788 or [blay@cyllene.uwa.edu.au](mailto:blay@cyllene.uwa.edu.au)*

### **LECTURER DR MELISSA LICARI**

- Prevalence and inhibition of motor overflow in children with Developmental Coordination Disorder  
*Supervision panel: Melissa Licari & Siobhan Reid*
- Muscle tone and strength in children with Developmental Coordination Disorder  
*Supervision panel: Melissa Licari & Siobhan Reid*
- Field assessment versus clinical assessment to measure physical fitness in children with Developmental Coordination Disorder  
*Supervision panel: Melissa Licari & Kym Guelfi*
- Physiological profiling of children with Developmental Coordination Disorder  
*Supervision panel: Melissa Licari & Kym Guelfi*
- Optimising exercise in overweight children  
*Supervision panel: Melissa Licari & Kym Guelfi*
- Movement and psychological outcomes for children participating in the Unigym programme  
*Supervision panel: Melissa Licari, Siobhan Reid & Rebecca Braham*
- To what extent is Developmental Coordination Disorder due to a lack of movement experience?  
*Supervision panel: Melissa Licari & Siobhan Reid*
- Movement proficiency of children with high functioning autism  
*Supervision panel: Melissa Licari*

*For more information, please do not hesitate to contact Melissa Licari on 6488 7282 or [mlicari@cyllene.uwa.edu.au](mailto:mlicari@cyllene.uwa.edu.au)*

## **ASSOCIATE PROFESSOR DAVID LLOYD**

David has three main research areas that have attracted substantial national and international funding (over \$M4.1) and are examining injury and degenerative disease to human articular joints. One focus is on the causes of, and means to prevent and treat knee joint osteoarthritis. The second area is on the causes of, and ways to prevent knee injuries in sport. The final area of study is on biomechanical modelling to assess motion and loading of muscles, ligaments and cartilage.

1. Changing of muscular control of the human knee stability using stochastic perturbations, electrical or vibration stimulations.
2. The effects of different training methods on the knee loading during sporting manoeuvres to reduce risk of knee injury.
3. The effects of cognitive demand of the knee loading during sporting manoeuvres and the risk of knee injury.
4. Pathological gait patterns and outcome after knee joint replacement surgery.
5. Pathological gait patterns and development of osteoarthritis of the knee.
6. Pathological gait patterns and outcome after knee joint surgery.
7. The central and peripheral effects of exercise on knee joint neuromuscular biomechanics and progression of osteoarthritis of the knee
8. Loading of the articular surfaces of the knee in walking in normal and knee injured subjects.
9. Loading of the ligaments and articular surfaces of the knee in walking and running in normal and knee injured subjects.
10. Development of perturbation rig control software to examine muscular control of the human knee subject to stochastic perturbation.

*For more information, please do not hesitate to contact David Lloyd on 6488 3919 or [dlloyd@cyllene.uwa.edu.au](mailto:dlloyd@cyllene.uwa.edu.au)*

## **RESEARCH ASSISTANT PROFESSOR SIOBHAN REID**

Research aimed at increasing the understanding of movement, activation and strength with particular emphasis on children with neuromuscular diseases & disorders. Populations of interest include; Cerebral Palsy, Developmental Coordination Disorder, typically developing children.

- What is the relationship between muscle morphology (MRI) and function in young children with Cerebral Palsy?  
*Supervision panel: Siobhan Reid, Catherine Elliott (PMH)*
- Do measures of MRI muscle morphology correlate with ultrasound in children with Cerebral Palsy?  
*Supervision panel: Siobhan Reid, Catherine Elliott (PMH)*
- How does muscle morphology (ultrasound) relate to muscle strength capacity in children with Cerebral Palsy?  
*Supervision panel: Siobhan Reid, Catherine Elliott (PMH)*

- Is the Gillette Gait Index predictive of functional ambulation in children with Cerebral Palsy?  
*Supervision panel: Siobhan Reid, Catherine Elliott (PMH)*
- Jerkiness of upper limb movement following strengthening for children with Cerebral Palsy.  
*Supervision panel: Siobhan Reid, Catherine Elliott (PMH)*
- The development of an upper limb movement index for children with Hemiplegia  
*Supervision panel: Siobhan Reid, Catherine Elliott (PMH)*
- Does parental perception of illness relate to a child's quality of life or functional capacity?  
*Supervision panel: Siobhan Reid, Catherine Elliott (PMH)*

*For more information, please do not hesitate to contact Si Reid on 6488 8781 or [siobhanr@cyllene.uwa.edu.au](mailto:siobhanr@cyllene.uwa.edu.au)*

### **ASSISTANT PROFESSOR JONAS RUBENSON**

- Force-Length properties of the gastrocnemius and soleus muscles in young and older adults using muscle fascicle imaging and force measurements.
  - Impaired gait in the elderly is thought to result primarily from adaptations in the calf muscle group. The force-length relationship is fundamental to muscle function, but has not previously been explored in older populations. This project uses non-invasive imaging techniques (ultrasound) in combination with dynamometry to provide the first measurements of the force-length operating range during walking in young and old age groups.
- Mechanical work production during walking in young and older adults.
  - A debilitating consequence of gait in the elderly is the marked increase in the energy required to walk. This study aims to understand the biomechanical factors leading to this elevated energy use and will help inform rehabilitative strategies for improving gait function and economy in the elderly. Projects analysing joint mechanical work as well as the mechanical work in individual muscles using ultrasound imaging are possible.
- Muscle mechanics during walking in Chronic Heart Failure patients.
  - CHF is a major health burden with an estimated 300,000 patient affected in Australia. Although the condition originates in the heart, it is now understood that skeletal muscle function is linked to exercise intolerance. Nevertheless, the mechanical function of skeletal muscle in CHF has not been well explored. This study aims to study the mechanical work output of the calf muscles during walking in CHF patients and age-matched controls.
- Validation of a computer optimization framework for predicting muscle mechanics

- Computer optimisation is used to predict the mechanics of individual muscles (strain and force) during movement. These predictions are crucial for understanding the function of muscle during gait. However, the accuracy of these predictions has seldom been tested. This study uses experimental measurements to validate predictions of muscle and tendon mechanics from a computer optimisation model.
- Mechanical work at the joints across the walk-run gait transition
  - One of the basic motor strategies adopted by humans and other limbed vertebrates is the use of walking and running gaits to achieve a broad range of speeds. Yet, the underlying mechanical explanation for this motor strategy has eluded researchers. This project aims to explore whether a reduction in the work output at the joints can explain why we choose to switch between walking and running gaits. This project will be performed using a new force-plate instrumented treadmill that can record joint kinetics continuously with increasing/decreasing speeds.

*For more information, please do not hesitate to contact Jonas Rubenson on 6488 5533 or [jonas@cyllene.uwa.edu.au](mailto:jonas@cyllene.uwa.edu.au). More information on Jonas' research can also be found at: [mfill-uwa.jonasrubenson.com](http://mfill-uwa.jonasrubenson.com)*

## EXERCISE PHYSIOLOGY AND BIOCHEMISTRY

### **WINTHROP PROFESSOR BRIAN DAWSON**

- Effects of caffeine/bicarbonate (and other ergogenic aids) on performance and training
- Effects of sand running and grass running on inflammatory markers and economy of exercise
- Work rate indicators and performance indicators in team sports
- Agility training and performance changes

*For more information, please do not hesitate to contact Brian Dawson on 6488 2276 or [bdawson@cyllene.uwa.edu.au](mailto:bdawson@cyllene.uwa.edu.au)*

### **PROFESSOR PAUL FOURNIER**

- Obesity and fat loss: How to lose body fat with a 5-min a week exercise programme. Co-supervisor: Kym Guelfi
- Obesity and fat loss: Optimisation of team sport design for energy expenditure in children and adolescents. *Co-supervisors: Kym Guelfi*
- Obesity and energy balance loss: Post-exercise fat oxidation associated with feeding in obese individuals. *Co-supervisors: Kym Guelfi*

- Optimal diet for carbohydrate loading.
- Ergogenic effects of a glucose mouth rinse and carbohydrate ingestion on sprint performance. *Co-supervisors: Kym Guelfi*
- The roles of free radicals as mediators of muscle fatigue in special populations. *Co-supervisors: Tony Bakker, Peter Arthur*
- Use of continuous glucose monitoring systems as a means to normalise blood glucose levels in type 1 diabetes. *Co-supervisors: Tim Jones*

*For more information, please do not hesitate to contact Paul Fournier on 6488 1356 or [fournier@cyllene.uwa.edu.au](mailto:fournier@cyllene.uwa.edu.au)*

### **PROFESSOR DANNY GREEN AND DR. LOUISE NAYLOR**

Drs Danny Green and Louise Naylor will be working collaboratively on projects involving the effects of exercise and exercise training on artery function and cardiovascular disease.

We welcome enquiries from Honours or PhD students who may be interested in research involving the impact of exercise on common diseases such as diabetes, obesity and heart disease.

Some examples of potential projects include:

- Impact of obesity and type 2 diabetes on artery function and future heart disease risk in children
- Effects of exercise training on obesity and diabetes in children with type 2 diabetes
- Impact of blood glucose on large and small artery function in children with diabetes
- Effect of activity restriction (inactivity) on the function of small and large arteries
- Impact of paraplegia on artery function. Effects of stimulated exercise training and upper limb exercise training in paraplegic subjects
- Effect of increasing physical activity levels on survival in patients with heart failure
- Effect of increasing physical activity on success of transplantation in patients with heart failure
- Effect of artery structure on changes in the function of arteries and arterial health
- Effects of resistance and aerobic exercise on vascular function in obese and type 2 diabetic subjects
- Effects of resistance and aerobic exercise on cardiac size and function using magnetic resonance imaging and echocardiography
- Effects of heat on skin blood flow regulation and mechanisms controlling skin blood flow
- Elite athletes: Impact of training on cardiac and vascular function and structure

*For more information, please do not hesitate to contact Danny Green on [d.j.green@ljmu.ac.uk](mailto:d.j.green@ljmu.ac.uk)*

**ASSISTANT PROFESSOR KYM GUELFI**

- The effect of exercise on appetite and food intake: implications for weight management (i.e. does exercise make you eat more!).
- The effect of a carbohydrate mouth rinse on single and repeated sprint performance (*Co-supervisor: Paul Fournier*).
- The effect of caffeine on exercise performance in sedentary individuals (*Co-supervisor: Karen Wallman*)

*For more information, please do not hesitate to contact Kym Guelfi on 6488 2602 or [kguelfi@cyllene.uwa.edu.au](mailto:kguelfi@cyllene.uwa.edu.au)*

**ASSISTANT PROFESSOR GRANT LANDERS**

- Effect of pre-cooling on exercise in the heat
- Effect of body composition on pre cooling
- Effect of pseudoephedrine on endurance performance
- Body composition and the benefits of swimming in a wetsuit
- Recovery techniques for high intensity exercise

*For more information, please do not hesitate to contact Grant Landers on 6488 2362 or [glanders@cyllene.uwa.edu.au](mailto:glanders@cyllene.uwa.edu.au)*

**ASSOCIATE PROFESSOR KAREN WALLMAN**

Students who might wish to undertake an Honours project with Karen Wallman should discuss the opportunity with her by contacting Karen on 6488 2304 or by email [kwallman@cyllene.uwa.edu.au](mailto:kwallman@cyllene.uwa.edu.au)

## HEALTH BEHAVIOUR AND PERFORMANCE PSYCHOLOGY

### **ASSISTANT PROFESSOR REBECCA BRAHAM**

- Can children really exercise in front of the television – an assessment of energy expenditure whilst playing television gaming machines
- Novice exercisers' perception of moderate intensity physical activity
- A measurement tool about nothing – measuring sedentary behaviours in adolescents
- Reliability of fundamental movement skill assessments
- Impact of group size on UNIGYM outcomes.
- Primary school teachers and Fundamental Movement Skills
- understanding how sporting associations, clubs, and other key stakeholders make formal decisions about sport safety and in-turn set safety policy
- understanding the enablers and barriers to implement policy into practice in various sport settings (at both organisational and individual levels)
- understanding the context of community sport (including societal and cultural aspects) and how these impact on safe sporting practices

*For more information, please do not hesitate to contact Rebecca Braham on 6488 2365 or [rbraham@cyllene.uwa.edu.au](mailto:rbraham@cyllene.uwa.edu.au)*

### **ASSISTANT PROFESSOR JAMES DIMMOCK**

- The prediction of spontaneous forms of physical activity from implicit and explicit self-efficacy.
- Imagine a scenario in which you are watching a social game of basketball when one of the players invites you to play with them. What would be your response to this opportunity? The purpose of this honours investigation is to determine the relative contribution of implicit (automatic) and explicit self-efficacy on people's inclination to participate in such activities.
- The non-conscious activation of motivation: Implications for exercise
- Many people employ dissociation strategies during their exercise by reading magazines or by watching television. Can different types of dissociation (e.g., reading a story about someone who is enjoying their work / reading a story about somebody who is bored at work) differ in non-consciously activating motivation for the

secondary task (their own exercise)? Students can choose from a series of studies in which different forms of dissociation strategies are compared.

- Do you exercise to avoid losses (avoid becoming overweight, preventing disease, etc.) or to obtain gains (becoming more athletic, attractive, etc.)?
- A study is planned in which our chronic orientation to avoid losses (prevention orientation) or to obtain gains (promotion orientation) is activated via priming. This priming will involve a task in which pictures of overweight or athletic people will be viewed. The effect of this priming on subsequent exercise (spin bicycle task) will be examined.
- 'I just hit out – I wasn't thinking'. Accessibility to aggressive thoughts as predictors of impulsive versus deliberate aggression.
- This study will determine factors that contribute to impulsive aggression in sport. Please speak to James Dimmock for more information on this topic.

*For more information, please do not hesitate to contact James Dimmock on 6488 1384 or [dimmock@cyllene.uwa.edu.au](mailto:dimmock@cyllene.uwa.edu.au)*

## **ASSOCIATE PROFESSOR SANDY GORDON**

- **Mental Toughness - 4 possibilities**

- 1. Qualitative Research**

- Towards an understanding of mental toughness in sport, the arts or business.
  - Elite vs. sub-elite; Male vs. female; Team vs. individual sports
  - Methodological variations (e.g., revised performance profile, longitudinal interviews, experience cycle methodology)
- Key stakeholders' (e.g., players, parents, coaches, sport psychologists) perceptions on the development and maintenance of mental toughness in sport, the arts or business.
- Transferability of mental toughness from sport to other life settings (e.g., education).

- 2. Quantitative Research**

- Psychometric examinations of the:
  - Australian football Mental Toughness Inventory
  - Cricket Mental Toughness Inventory
- Examining the antecedents and outcomes of mental toughness using:
  - Other psychological constructs (e.g., hardiness, resilience, burnout, flow, well-being, etc.)
  - Objective measures (e.g., performance, beep test, etc.)
- Differences/similarities between multisource (self, parent, and coach) ratings of mental toughness.

- 3. Mixed-Methods Research**

- Changes in mental toughness over the course of a competitive season.
  - Interviews combined with questionnaire data and training diaries.
  - Case study approaches
  - Comparison of demographic groups (e.g., male vs. female)
- Mental toughness and the injury rehabilitation process.

- Relationship with adherence, coping, etc.

#### **4. Intervention Research**

- Comparing psychological skills training programs with interventions specifically targeting key mental toughness characteristics.
- Comparing athlete, parent, and coach education/training programs
- What is the most appropriate age to implement interventions designed to develop/enhance mental toughness?
- Comparing single-subject vs. group methodologies.

- **Evaluation of a Life-Coaching Program among First Year University Students**

Among 1st year University students a Life Coaching intervention will evidence positive change in perceptions of resilience, hope, and personal & academic strivings; and, decline in perceived levels of stress and anxiety. (Hons study presented/approved 2007)

- **Positive Psychology – Various possibilities (see Sandy)**

*For more information, please do not hesitate to contact Sandy Gordon on 6488 3504 or [sandy.gordon@uwa.edu.au](mailto:sandy.gordon@uwa.edu.au)*

#### **RESEARCH ASSOCIATE DR BEN JACKSON**

Ben's research focuses on *the factors that make close relationships work (or not) in sport, health and exercise*. There are numerous forms of important relationships or partnerships in these settings, including coach-athlete, athlete-athlete, therapist-patient, and psychologist-athlete pairs, and so on. Recent research has shown that various psychological factors can be important in ensuring people feel committed to and happy with their relationship, including confidence beliefs, personality traits, and communication styles. Various opportunities are available to explore one or more of these factors in more detail, using a variety of interview, questionnaire, and experimental methods.

*For more information or to discuss any potential areas of interest, please contact Ben on 6488 4625 or [bjackson@cyllene.uwa.edu.au](mailto:bjackson@cyllene.uwa.edu.au)*

### **WINTHROP PROFESSOR BOB GROVE**

Bob has research interests in sport psychology, exercise psychology, and health psychology. Specific topics that could be pursued for honours-level research under his supervision include:

- Assessment and development of exercise habits
- Physical self-concept, physique anxiety, and health behaviour
- Psychological consequences of high-intensity training
- Attentional processes during long-duration sports events
- Effects of self-talk on motor performance
- Field tests for the prediction of throwing speed

*For more information or to discuss any potential areas of interest, please contact Bob Grove on 6488 2369 or [Bob.Grove@uwa.edu.au](mailto:Bob.Grove@uwa.edu.au)*

### **ASSOCIATE PROFESSOR MICHAEL ROSENBERG**

1. Have children become more or less physically active since 2003? (comparison of data collected in WA in 2003 and 2008)
2. By the time you choose to study the significant changes in BMI in Western Australian children between 2003 and 2008, it will be a widely publicised finding. However, there will remain numerous questions around why the change has occurred and why?
3. Health Sponsorship is technique used by Healthway to promote health messages, including Find 30, at selected sports, arts and racing events. The relevance of this message to people already physically active is questionable. Data collected from approximately 60 state wide events holds several important questions about how to promote sponsorship

*For more information, please do not hesitate to contact Michael Rosenberg on 6488 4654 or [rosey@cyllene.uwa.edu.au](mailto:rosey@cyllene.uwa.edu.au).*

## PHYSICAL AND HEALTH EDUCATION

*If you wish to undertake your Honours project with Dr Peter Whipp and Mr Martin Anderson, please do not hesitate to contact them on 6488 2793 or [pwhipp@cyllene.uwa.edu.au](mailto:pwhipp@cyllene.uwa.edu.au) and 6488 3918 or [martina@cyllene.uwa.edu.au](mailto:martina@cyllene.uwa.edu.au)*

## EXERCISE REHABILITATION OR OCCUPATIONAL SAFETY AND HEALTH

Students who might wish to undertake an Honours project in these discipline areas should discuss the opportunity with Winthrop Professor Tim Ackland or Dr Jay Ebert.

*For more information, please do not hesitate to contact Professor Tim Ackland on 6488 2886 or [tackland@cyllene.uwa.edu.au](mailto:tackland@cyllene.uwa.edu.au) or Dr Jay Ebert on [jayeibert@cyllene.uwa.edu.au](mailto:jayeibert@cyllene.uwa.edu.au).*