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A vibrant sustained research culture and environment is what the School of Health and Human Sciences continues to build as it continues to grow and develop. It continues to be the aim of the School to ensure both students and staff participate in either clinical outcomes-based research that has a positive impact on people in the community, or pedagogical research that has a positive impact on students.

Over the last year, a range of SHHS research outputs have achieved acknowledgement for research excellence, both nationally and internationally. This is being achieved because we have been aiming to adhere to the following characteristics. We have a staffing recruitment strategy which focuses upon two elements. The first element is to attract well qualified and experienced teaching and research-focused staff. The second element, of which we are building a successful reputation, is to actively support staff to gain higher qualifications and degrees. Retaining such staff is essential too, as is encouraging those same staff to access personal development opportunities and actively participate in annual appraisals and mentorship opportunities. This all helps to build a learning organisation culture, which in turn supports scholastic activity. Accessing nationally-based early and mid-career development programmes for our staff is essential too, and we have been successful in this endeavour.

We continue to build research collaborations with health, welfare and other agencies involved in the provision of health and wellbeing services. Often these collaborative partnerships have the right infrastructure needed to support our research interests, which are often of mutual interest. These partnerships are seeding joint appointments and the work emanating from them contributes to improved welfare for people in the community and improved education of the School’s students.

The School’s own infrastructure is important too, as is the associated role of the various technical and professional staff. An essential component of this infrastructure is the University Clinic which is gearing up to facilitate both clinical and pedagogical research as we go forward into 2018 and beyond.

We hope to establish clinical academic fellowship programmes, in order to build research capacity, and through them extend the role of the clinic into the local community. Through the clinic and other key partners we are securing a base, with practitioners of health and welfare, post-graduate students, and the various services which are necessary when building such a culture. It is from such endeavours we will help to grow the next generation of research leaders in our respective fields. This in turn is helping the School to forge both national and international partnerships and collaborations, aiming to attract international post-graduate students into both our expanding post-graduate education framework and doctorate studies. We hope to compliment these current provisions by adding a professional doctorate programme into the mix.
As a school where more than seventy percent of both staff and students are female, we also aim to be sensitive in the promoting of women and, to some extent, indigenous men, into the academic side of health and welfare.

To support our scholarship culture, staff are encouraged to be editors and reviewers, to be nominated to sit on committees and organisations which enable them to profess their discipline and profession, and to bring their learning from such events back into the School.

In essence, to be a successful research and scholarly environment, a wide range of activities need to be pursued by a university school or faculty. They range from the most concrete of things to the most abstract: spotting talent in our undergraduate students, for example, and working with partners to create new pathways so that talent can be nurtured. Ensuring our doctorate students complete their studies and devising methods to display and disseminate their work is important too.

So, this coming year will see the School move further along in its progression to achieve these aims. It is always a work in progress. We will always be affected by various drivers and challenges but I believe we have made considerable progress and the signs are we will make more.

Professor Iain Graham
PhD RN FACN
Dean and Head of School
Director of Clinical Services
School of Health & Human Sciences
Southern Cross University
Welcome to the School of Health and Human Sciences’ Annual Research Report, in which we present an overview of the School's research activities in 2017, its demonstrable contribution to scientific advances and its benefits to individuals and organisations in Australia and beyond. Southern Cross University aims to create research and research training that has global and regional relevance and impact. It has a large regional footprint that extends from Coffs Harbour to the Gold Coast and brings expertise from researchers in the School to the promotion of health in individuals and communities, and to the delivery of regionally focused person-centred health care.

The global and national research landscape continues to be a major influence on the way we conduct our research. The National Innovation and Science Agenda has strengthened our focus on industry-research collaborations and we continue to turn our attention to the benefits of our research on the economy, environment, society and culture.

In 2017, researchers in the School submitted 22 Category 1, 2 and 3 grant applications and were successful in 11 of them. Increasingly, our research activities have been aimed at prevention, treatment and rehabilitation of a full range of long-term conditions, as well as understanding the physiological bases of the treatment and management of disease. For example, one of our clinic-based studies investigated the effect of indigenous dance in the prevention of osteoporosis. Our 2017 endeavours in the field of exercise and sports science research included an exercise and sport science graduate destination survey, a physical fitness survey for the Australian population and an investigation into the effects of long haul travel, sleep disruption, heat and competition on immunity and self-reported illness before and during endurance competition. Our psychology research included an investigation into brain changes after training in positive emotion detection, and family violence perpetrator interventions.

We have established a strong foundation of research in health workforce development and re-design, with a particular focus on community-based practitioners and the non-medical workforce. Our nursing research focused on creating and translating evidence of mental health strategies that enhance the practice of nursing and midwifery, and the preparedness of their workforces. We continued to strengthen our allied health and complementary medicine workforce research in 2017 with investigations into the medical technician workforce and into patients’ strategies for integrating conventional and complementary medicine. Other allied health research in 2017 included an investigation into the footwear habits of people with diabetic neuropathy, the assessment of language and cognition in speech pathology, and an evaluation of a dementia health literacy project in the Tweed region.

We have continued to strengthen and develop our partnerships with our colleagues from other universities, nationally and internationally, and with our industry partners. It is a particular strength of this School that we have many strong industry partners who closely engage with all stages of our research and consequently ensure that our results readily translate into real world applications. For example, Drs Gail Moloney and Alison Bowling developed a community research partnership with NSW Organ and Tissue Donation Service that delivered a practical strategy to increase registrations on the Australian Organ Donor Register. In 2017 we also saw the establishment of Southern Cross University’s Centre for Organics and Nutrition Research, in partnership with the NSW Department of Primary Industries. Collaborations with industry partners are being established and promise great opportunities for organics research in the years ahead.
The School’s focus on translating research into practice is evident in our educational programs as we strive to prepare graduates who are equipped to meet the challenges of a rapidly changing work environment. We also explore educational research in its own right, through innovation in educational technologies, clinical placements and our emerging focus on clinical scholarship. The School has continued to develop interdisciplinary health care research and practice, drawing on its range of disciplines and methodological expertise, and capitalising on the extensive research infrastructure available to it. This includes neuropsychology laboratories in Coffs Harbour, exercise science laboratories at Lismore, Gold Coast and Coffs Harbour campuses, and a pedorthic laboratory at Gold Coast campus.

I would like to take this opportunity to express my appreciation of the outstanding achievements of the School’s researchers, some of which are showcased in this report. For further information on the School’s research projects, publications and other research activities please visit the School of Health and Human Sciences Research facebook page.

**Associate Professor Sandra Grace**
PhD, MSc, GradCertSportsChiro, DO, DC, DipAcup, DBM, DipEd, BA
Director of Research
School of Health and Human Sciences
Southern Cross University
Research Philosophy of SHHS

The School’s research strategy seeks to understand and explore the fundamentals of human experience based on humanistic principles. Comprehending how practitioners learn their art and science and how clients and patients experience the application of that is at the heart of our scholarship.

A humanistic, person-centred approach to understanding and helping people is rooted in a phenomenological tradition. The phenomenological view of the person does not try to impose any theoretical construct on the learning or caring experience, but seeks to make sense of the experienced behaviour either from a subjective or objective perspective.

We seek to explore the learning and caring worlds that we all inhabit.

Research Strategy of SHHS

1. PROMOTE QUALITY AND EXCELLENCE IN HEALTH RESEARCH

Support strategic priority research areas that leverage research strengths, align with our values and mission, and deliver significant benefit and impact to society (regionally, nationally, internationally)

2. BUILD COLLABORATIONS

Build a collaborative research community, securing growth through entrepreneurial initiatives

3. BUILD THE SCHOOL’S RESEARCH CAPACITY

Target research capacity development in line with our key research priority areas

4. INCREASE SHHS’ RESEARCH IMPACT AND REPUTATION

Enhance the School’s reputation for producing research with regional, national and global impact and relevance by promoting person-centred science, technology and innovation and translating these findings into teaching and clinical practice in health

5. INCREASE THE NUMBER AND QUALITY RESEARCH OUTPUTS

Increase the School’s publications in high impact journals and the number of successful national and international competitive grants
Quality and Excellence in Health Research

Restrictive and repetitive behaviour in ASD project

Professor Andrew Cashin

This project has a focus on restrictive and repetitive behaviours (RRBs) lived by people with Autism Spectrum Disorders (ASD). These behaviours form one half of the diagnostic construct of ASD, yet there remains a real paucity of research in this area. The work occurred in partnership with Professor of Mathematics and Physics, James Yorke, from Maryland University.

Together, Professors Cashin and Yorke theorised the function of restrictive and repetitive behaviours, influenced by thinking related to Chaos Theory. Professor Yorke is credited with coining the term Chaos Theory. He named the field of chaos in his paper “Period Three Implies Chaos”, written with TY Li. With collaborators, he discovered many of the fundamental phenomena of nonlinear dynamics that are observed throughout science and engineering, including the notions of “fractal basin boundaries” in physical systems, “transient chaos”, and the sudden transitions in basins of attraction called “crises”. The Kaplan-Yorke dimension is widely used as a measure of the magnitude of chaos in mathematical models of natural phenomena. Drawing on this background work, Profs Cashin and Yorke published a paper entitled “Overly regulated thinking and autism revisited” in the Journal of Child and Adolescent Psychiatric Nursing.

The next step was work to develop a heuristic that would allow prediction of the likelihood of someone with ASD becoming locked into restrictive and repetitive behaviours. This is important, as despite the lack of evidence-based findings to inform practice, clinicians and school teams are called on to make prognostic decisions related to the likelihood of reduced functioning associated with becoming locked in. Cashin and Yorke proposed the simple tally heuristic $\Delta RRB = -E + A + H$ in their paper “Conceptualisation of a heuristic to predict increases in restricted and repetitive behaviour in ASD across the short to medium term”. Where $E$ represents external structure, $A$ represents anxiety and $H$ a history of getting locked in in similar circumstances (allowing anamnestic prediction).

Following this, an online survey was conducted to begin to empirically explore the relationship between these variables. The survey was distributed in countries where English is the first language. The hypothesised relationships were found to be consistent with the data, and the evidence base for the heuristic has begun to be constructed.

From the findings, it was clear that if externally imposed structure declines and anxiety rises, the risk of becoming locked into RRBs increases, and this is particularly the case for those who have a history of this. More research is needed and this forms part of the agenda for 2018.
Quality and Excellence in Health Research

The effect of manual therapy and exercise on age-dependent lung function: a randomised controlled trial

A/Prof Sandra Grace
Dr Roger Engel

Paul Purchase, Holger Honum, Sophie-Anne Bruce, Inaki Ruiz-Molina, Anthony Wrigley, Matthew Meadows, Robyn Bailey, Chelsea Luker and Alana Parry (students enrolled in the Master of Osteopathic Medicine, Southern Cross University)

Ageing is associated with a range of anatomical and physiological changes that include the respiratory system. These changes can begin as early as 40 years of age and include stiffening of the spine and chest wall. This stiffening has an impact on breathing mechanics and contributes to the progressive decline in lung function typically associated with ageing. The aim of this trial was to investigate whether manual therapy could reduce stiffness in the spine and chest wall and improve lung function in older healthy people.

The trial was designed as a randomised controlled trial, with healthy people between the ages of 50 and 65 years randomly allocated to one of three equal groups. Group 1 (Control) received a standardised exercise program performed on a treadmill. Group 2 received a mobilisation protocol designed to increase joint mobility in the thoracic spine and ribs followed by the same standardised exercise program. Group 3 received a manipulation protocol designed to increase joint mobility in the thoracic spine and ribs, followed by the same exercise program. Each participant received six intervention sessions over a period of three weeks.

Outcome measurements taken by blinded assessors (unaware of group allocation), included non-invasive lung function measurements (spirometry), chest expansion (tape measure) and a respiratory function questionnaire. These measurements were taken on four occasions: before the first intervention (baseline), at the end of the intervention period (3 weeks), and then again at 3 and 6 weeks post-intervention (i.e. week 6 and 9 of the trial). The last two measuring points were designed to assess whether the effects of intervention were ongoing.

The significance and innovation of this research was the attempt to address age-dependent declining lung function, which has been linked to decreases in muscle strength, exercise capacity and quality of life. The first stage of the Manual therapy, Exercise and Lung function Trial (MELT) was conducted at the Lismore campus and completed in March 2017. The second stage was conducted at the Gold Coast campus and completed in February 2018.

A total of 144 participants completed the trial. Their average age was 58.7 years, with 82 participants (57%) female. During the trial, 253 mobilisation and 282 manipulation sessions were administered. There was no difference in the amount of change over time between groups for lung function, chest expansion or quality of life. There were also no reports of moderate or severe adverse events following either form of manual therapy intervention.

A course of manual therapy to the chest wall of healthy people aged between of 50 and 65 does not appear to mitigate the effects of ageing on chest wall compliance sufficiently to produce changes in lung function. From a safety perspective, manual therapy performed by osteopathic interns is relatively safe for this cohort of people. Further research in the field, to determine whether the effect of manual therapy differs when performed by experienced osteopaths, is warranted.

This study was sponsored by Osteopathy Australia and SCU School of Health and Human Sciences.
Quality and Excellence in Health Research

Could aquatic therapy help with chronic fatigue?

Dr Sonja Coetzee and Associate Professor Suzanne Broadbent

Chronic Fatigue Syndrome / Myalgic Encephalomyelitis (CFS/ME) is a complex, debilitating medical condition with an unclear pathogenesis and no known cure. Patients suffer from severe fatigue and malaise, especially after exertion, and the condition may be further complicated by co-conditions such as fibromyalgia syndrome, which occurs in up to 70% of CFS/ME patients. Individuals with CFS/ME who remain sedentary are at risk of developing lifestyle diseases such as cardiovascular disease, type 2 diabetes and cancer. However, the most appropriate modes of exercise for CFS/ME patients remain uncertain, as post-exertional malaise and symptom exacerbation are common in patients who try to do too much physical activity.

People with fibromyalgia are often prescribed gentle water exercises. This condition, like CFS, often inflicts fatigue as well as widespread pain and tenderness in the body. However, aquatic exercise or hydrotherapy has yet to be trialled with CFS patients. This led Drs Sonja Coetzee and Suzanne Broadbent to conduct a small, short-term pilot study investigating whether gentle water exercise could help people diagnosed with CFS.

Individuals diagnosed with CFS were asked to take the plunge and join the pilot study at Southern Cross University’s Lismore campus to assess the benefits of aquatic therapy as part of their usual treatment. The results from this short 4 week trial were extremely positive and encouraging, with significant improvements in exercise capacity and reduced symptoms, including post-exertional malaise. Psychosocial benefits as well as physiological benefits were found. The participants reported enhanced self-efficacy and enjoyment of the aquatic exercises, despite initial concerns regarding symptom exacerbation.

On the back of these promising results, the researchers were recently successful in securing a larger grant with the National Medical Program’s Mason Foundation. They plan to conduct a larger, longer-term 6 month trial. One of the aims of this study will be to provide evidence for optimal frequency, duration and intensity of aquatic exercise sessions, and investigate whether there are longer-term benefits such as behaviour change and sustained reduction in symptoms.

Recruitment of participants for this exciting new study is set to start early in 2018.
Research Collaborations

Glycaemic control to treat foot ulcers

Dr Joanne Rowley

Dr Joanne Rowley, a Southern Cross University (SCU) and Mid North Coast Local Health District (MNCLHD) conjoint appointment, is currently conducting a MNCLHD funded study, Glycaemic Control to Treat Foot Ulcers.

The research team includes MNCLHD Clinical Nurse Consultants (CNC) in wound and diabetes management, and support from SCU academic Dr Jim Donnelly. The study aims to determine whether intensively controlling blood glucose levels in people with type 2 diabetes who have a foot ulcer influences ulcer healing and reduces the incidence of lower limb, partial or full amputation, as compared to usual treatment.

Diabetes is an increasing health problem in Australia with approximately 80% of clients who attend the Coffs Harbour Health Campus Community Health wound clinic suffering from the disease. Lower limb amputation can be an ongoing threat to people with diabetes who develop foot ulcers. For people with diabetes, the likelihood of lower limb amputation is estimated to be 10 to 30 times higher than in those without diabetes.

Outcome measures for the study include serial comprehensive ulcer ratings over 12 weeks, and amputation rates. Demographic, premorbid and current risk factors are also being recorded. The intervention is continuous glucose monitoring (CGM). A small device is placed on the skin and senses levels of glucose in the fluid under the skin. The device wirelessly transmits results to a small recording device.

At the end of the monitoring period (14 days), CGM glucose results are downloaded from the continuous monitor into a computer. The graphic display allows the Diabetes CNC to analyse the blood glucose trends over time and share the results with the client. We are finding that this is increasing clients’ awareness of the effects of their diabetes management. In addition, clients are maintaining a food and medication diary. Any abnormal results are discussed in consultation with the client’s general practitioner.

This is a pilot study so the results will only be an indication of this client group and may not be generalisable across large populations. Additionally, clients are drawn from a single health organisation within a regional geographic context. If this study shows promise we plan to submit for a larger grant to address such limitations.
Research Collaborations

Integrating Emotional Intelligence into clinical decision making processes within hospital settings: A multi case study project

Associate Professor Marie Hutchinson, Associate Professor John Hurley, Dr Desirée Kozlowski, Dr Jo Sutherland (Mid North Coast Local Health District) and Dr Jo Rowley (Mid North Coast Local Health District)

The research team trained 30 registered nurses in Emotional Intelligence (EI) and then undertook qualitative interviews from both those nurses and other nurses who had earlier received the same EI training. The training had significantly lifted the EI scores of those in the earlier study at three months post-training from initial baseline levels.

The qualitative interviews found that the registered nurses used their enhanced EI in a number of innovative ways. Firstly, the nurses used it to inform and guide their clinical decision making and patient advocacy. The nurses were more emotionally attuned to themselves and others around them, as well as being more motivated to actively engage with the emotional aspects of decision making.

Nurses described a process of actively engaging with present emotion, at the same time as being able to engage with analytical or purely technical approaches to decision making. Employing EI Situational Awareness, nurses also described their ability to rapidly recognise and determine the significance of emotional information in clinical settings. These findings suggest that more attention could be given to developing nurses’ EI as an important factor in improving patient safety.

The nurses in the study also reported utilising their EI training to respond to and work more effectively within very challenging workplace environments. They especially used their EI to respond to the everyday adversities of providing complex healthcare. Nurses in the study reported using their EI capabilities to respond to conflict in the workplace and to be less affected by bullying.

This is a small qualitative study so the results are only an indication of the participants’ experience and hence may not be generalisable across large populations. Additionally, participants were drawn from a single health organisation within a regional geographic context. Future research would address such limitations.
Interprofessional education (IPE): a primary health care initiative

Dr Christina Aggar, Ms Beth Mozolic-Staunton, Ms Maggie Scorey, Ms Renee Lovi, Ms Melissa Kemp, Mr Michael Grande, Ms June Colgrave, and Ms Tamsin Thomas

In Australia and internationally, interprofessional education (IPE) is becoming increasingly important in health care delivery, and is core to delivering patient-centred care. The aim of this research was to provide a primary health care IPE opportunity to students from varied health disciplines to improve collaborative attitudes, knowledge, behaviours, and skills. A new undergraduate student clinical placement was developed, implemented and evaluated by the School of Health and Human Sciences in the area of primary health care, specifically health promotion.

Sixty students participated in placements in rural Australia and internationally, including placements in Cambodia and Vietnam. Students completed questionnaires about their interprofessional attitudes and behaviours before and after their placements, and participated in focus groups. Prior to clinical placement students recognised the importance of IPE professionally and for patient care:

I feel that learning about other health professionals, what they do, their assessments and what they look for in patients, will enhance my clinical skills and be beneficial for my future patients. Integrating IPE placements into all health degrees will also help to get rid of the stigma/hierarchy between health disciplines for us – the future of health care.

Results demonstrated that students’ interprofessional cooperative attitudes and skills improved significantly over the course of the placement, including working well together, sharing resources, and having high regard for other disciplines. There was also a significant improvement in students’ understanding of their role in interprofessional cooperation. This included believing that other disciplines regard their own discipline highly and seek advice from them, and in turn that their discipline endeavours to understand the capabilities and contributions of others. Students’ perceptions of the competence and autonomy of their own disciplines also improved over the course of the placements.

Building on the positive elements of this interprofessional clinical experience, recommendations include consideration of IPE shared curriculum and assessment, and skilling of facilitators with primary health care expertise to enable critical interprofessional student experience and discussions.
Research Collaborations

Accelerating skin repair with innovative wound dressing

Dr Rosemary Craig

Dr Rosemary Craig is a general practitioner at the Southern Cross University Health Clinic and an Adjunct Professional Fellow of the School of Health and Human Sciences. Her research is in biomolecular physics and engineering where she is developing novel therapeutics which aim to modify the formation of the extracellular matrix in the connective tissues of the body.

The connective tissues make up a large part of the structure of a living body. The spaces between the cells in these tissues are packed with various molecules. In the past century, these molecules were assumed to be in a disordered gel. However, as the ability to see the nanoscale improves, it is becoming more obvious how important the position of these molecules is. Living cells produce the molecules of the extracellular matrix and they flow into position in order to lock together in a specific formation. These molecules have physical properties, such as diamagnetic or piezoelectric properties, or being electrostatically charged. These properties can be harnessed to control the position they take within the matrix.

Dr Craig is running a pilot study in skin repair. The dermis of the skin contains an extracellular matrix made up of a molecular gel containing structures such as hair follicles and glands. The dermis is the slowest part of the skin to repair, since the molecular connections need to be strong enough to resist re-opening. This study uses a specific type of magnetic field which aims to imitate the electromagnetic conditions of an intact piezoelectric collagen network in order to modify skin repair. The magnetic field limits the variability in position that the electrostatic and diamagnetic molecules can adopt as they set. An external adjunct device is employed which projects a magnetic field into one half of a wound that has been closed under tension, after a skin cancer has been cut out. The other half of the wound is used as the control, with identical conditions except for the magnetic field. This type of wound would normally need to be sutured closed for about 10-14 days before the skin repair was strong enough for the sutures to be removed and the wound remain closed. As the research progresses, we are removing the sutures earlier and earlier. We are now removing the sutures after 2 days without the wounds re-opening, which is a very significant finding.

Former research has shown that cell cultures in strong magnetic fields normally take more than 2 days to increase their metabolism, replication and differentiation. The ability of the wounds in this study to remain closed without the support of sutures after 2 days suggests that the result is not due to a cellular function but due to a molecular effect where the magnetic field projects a virtual scaffold into the dermis of the skin and influences the process of the molecular formation in order to accelerate a structurally superior repair.
Building Research Capacity

Director of Higher Degrees by Research Training

Dr Joanne Bradbury

The School of Health and Human Sciences (SHHS) has a diverse and vibrant Higher Degree by Research (HDR) culture. The school has a wealth of expertise in research supervision, training and mentorship that attracts high quality postgraduate research students across a range of topic areas. Our academics are collectively training the second largest cohort of HDR students in the university. The school was awarded 40% of the highly competitive Research Training Program (RTP) scholarships available for domestic students at SCU in the 2017 round.

HDR training is collectively provided through a community of mentors within the school but also includes external experts and industry collaborators. The current HDR cohort involves 42 supervisors, co-supervisors and external supervisors, 16 of whom are qualified principal supervisors. We currently have 41 HDR students, comprising 34 PhD and 7 Masters students. In 2017, there were 8 new enrolments, 5 completions, 8 Confirmations of Candidature, 3 In-candidature reviews, and the Annual HHS HDR Symposium during SCU’s Research Week.

Moving forward, we shall increase participation in HDR events by providing a web-based video-conferencing platform for remote attendance. This will facilitate participation, engagement and inclusion for those on and off campus and beyond the university to industry stakeholders.

Research does not happen in a vacuum. There are ever increasing pressures for university based research to be relevant and translatable in the real world, in addition to the traditional scholarly pursuits of making contributions to knowledge in the scientific literature. The theme of the 4th Annual HDR Symposium was ‘So What? Pitching the real world impact of research’. Students were challenged to develop a pitch for their research in a way that is engaging and highlights the potential impact of their research for industry. The best pitch was awarded an ACSPRI course to study a research methodology of choice. Learning how to pitch research will prepare our HDR cohort for ‘pitching’ innovative ideas in their future careers.

PhD graduates are drivers of innovation in industry. Australian Government policy aimed to forge closer collaborations between universities and industry will see greater emphasis on the preparedness of HDR students to work in industry after graduation. Our school has a history of active engagement with local health districts (LHDs). In addition, the new research priority areas for the university will include new funding opportunities for industry-linked projects and HDR scholarships.

We continue to welcome new HDR students and seek new collaborations with industry. The activities of the HDR students, supervisors, research-active staff, adjunct faculty, external reviewers and industry stakeholders collectively make up our ongoing rich and dynamic HDR training culture. If it takes a whole village to raise a child, so it takes a whole of school approach to train a health sciences researcher.

Dr Joanne Bradbury

PhD (Nutr Pharmacol.), BNat(Hons), BA(Psych/History), Grad Cert (Biostats), Grad Cert (Acad Prac)

Director, Research by Higher Degrees

Lecturer, Evidence-Based Healthcare
In 2017, the Bachelor of Psychological Science with Honours was offered internally at the Coffs Harbour campus. The degree, which is made up of course work and a research thesis, can be completed in a part-time or full-time mode. Recently, the number of students entering our degree from other universities has grown: 70% of the 2017 cohort completed their 3 year undergraduate psychology degree at a university located in the wider Sydney region. Students complete their research thesis on a variety of interesting topics, which were showcased this year at the 14th Annual Psychology Honours Research conference. Every student delivered a 12 minute presentation to the 100 or so conference attendees, who included the students’ family and friends, local psychologists and allied health workers, academics, and interested community members. The Opening Address was given by a past Honours student, Ms Jennifer Rees-Brown, who is a practicing clinical psychologist in Coffs Harbour.

Overall, the year was extremely successful, with 31 students graduating with the Bachelor of Psychological Science with Honours.

### Highlights of the year:

- **Rachel Clark**: Nominated for the Australian Psychological Society prize for the top student in the Honours year: Facebook Use and Psychological Needs in Older Adults

- **Blake Toohey**: Awarded the Best conference Presentation and People’s Choice Award (Day 1): Moving to the Beat: Can Music Impact Perceptions of Time & Exertion During Exercise?

- **Dedar Abdula**: Awarded a Highly Commended Conference Presentation: Overconfidence in Gambling: How well do you think you went?

- **Holly Sansone**: Awarded a Highly Commended Conference Presentation: Do you have a brain that makes you love exercise?

- **Alex Pupovac**: Awarded a Highly commended conference presentation: Do you have a moment? Eliciting empathy and reinforcement to encourage charitable behaviour

- **Samatha Johnstone**: Awarded the People’s Choice Award (Day 2): Sexual attraction, behaviour and pleasure: It’s complicated
Building Research Capacity

Allied Health Embedded Honours

Associate Professor Michelle Donelly

Congratulations to Laura Burritt and Brianne van Rhyn, students from the embedded honours program who have been awarded PhD scholarships to commence in 2018. Also congratulations to Claire Lusted who received the University Medal for her honours thesis and coursework achievements. Congratulations to Jemma Matthews on the acceptance of her peer-reviewed publication even before she had graduated! Congratulations to the first cohort of honours students who graduated early in 2017. The hard work and achievements of the students and supervisors who have pioneered the introduction of the embedded honours program at Southern Cross University have been outstanding. These achievements signal the excellent match between the design and delivery of this program and the research needs, interests and capabilities of allied health students.

The allied health embedded honours program at Southern Cross University provides a program of supervised research enabling successful candidates to complete a research project and to understand the foundations of research, including conceptualising and undertaking a research project and understanding a topic at much greater depth. This increases the competitive standing of graduates for employment; prepares them for a research career in clinical practice, higher education or a research organisation; and provides a pathway to research higher degree study. The achievements of our graduates indicate that all these goals are being realised even among the first cohort.

Honours projects are a valued strategy for responding to community requests for investigation into key concerns, contributing to engagement within the community and research translation. Honours graduates have investigated topics such as parent child interactions around on-screen time; parental perspectives on family centred intervention approaches; the use of pulse oximetry in the lower limb to monitor a range of chronic health conditions; responding to the needs of children with autism in inclusive classrooms; and the clinical reasoning of practitioners introducing innovative treatment technologies. These community-engaged research projects also demonstrate that we are responsive to the serious and important issues affecting the lives of people and pursue these topics in a rigorous and thorough manner.

Some students have enrolled in our bachelors programs with a focus on achieving at the highest level in order to facilitate competitive entry into the honours program. Such role models have had the effect of raising the academic standards of the entire student cohort. We congratulate all students and supervisors on their outstanding achievements in this brand new research program at Southern Cross University.
Building Research Capacity

A qualitative study to determine the supports and barriers for returning to professional or competitive surfing after an acute physical injury

Maggie Scorey | Masters candidate

Surfboard riding is enjoyed as a recreational and competitive sport by many people in Australia and internationally. In 2014, there were 740,000 Australian recreational surfers above 14 years old. Currently, there are 15 Australian men and 10 Australian women on the professional world circuit Championship Tour, managed by the World Surf League, and many more professional surfers in competitions such as the Qualifying Series. For competitive surfers, injury rates of between 4 and 8.7 injuries per 1,000 hours of surfing have been reported, compared to 2.7 injuries per 1,000 hours for amateurs. Research to date about surfing injuries and rehabilitation has focused primarily on injury rates and types of injuries.

Transcendental phenomenology is being used to produce a rich description of the lived experience of professional surfers after they have suffered an acute physical injury. An occupational therapy model called the ‘Person-Environment-Occupation-Performance’ model guided the development of the semi-structured interview guides, and data analysis will be informed by the ‘self-determination theory’, a framework for motivation and personality.

It is expected that this research will contribute to the limited body of knowledge about rehabilitation of professional surfing injuries. The research will help to determine how best to assist professional surfers to return to surfing following an acute physical injury. It will also identify additional supports required to accelerate return to competition. These findings may increase health care providers’ and coaches’ understanding of valuable supports that enhance return to competitive surfing. It may also enable recommendations to be made to Australian surfing associations regarding rehabilitation processes.

This research was showcased at the 2017 HDR symposium in Lismore. Maggie received runner-up for the best presentation and real-world impact.
Muscle physiology is an area of great interest for scientists. Much is understood regarding the process whereby an activated muscle produces force. The generally accepted mechanism of active force production in a muscle is based on a pioneering model by Huxley; the so-called ‘cross-bridge theory’. The great success of the cross-bridge model is based on nearly flawless predictions of force output via contractions at constant muscle lengths (isometric contractions) and contractions where the muscle is allowed to shorten (concentric contractions). However, it cannot account for some prominent observations that are made when an active muscle is stretched (eccentric contraction).

Two such phenomena are the ‘residual force enhancement’ (RFE) and ‘activation reduction’ (AR). Both of these occur when an initial isometric contraction precedes an eccentric contraction, and is quickly followed by a final isometric contraction, known as a post-stretch isometric contraction. The post-stretch isometric contraction is either greater in force than the initial isometric contraction (RFE) or requires lower muscle activation to achieve the same force as the initial contraction (AR). Efforts to explain the mechanisms behind these phenomena have led to modifications of the original cross-bridge theory, as well as the development of alternative hypotheses. Despite a growing body of research, scientists are yet to definitively explain the mechanisms behind RFE and AR, or the role of RFE and AR in relation to activities of daily living.

There appears to be an exciting potential for utilising these types of contractions with athletes. The high force and low energy cost of RFE and AR-based techniques makes them particularly well suited for athletic training. They can also be prescribed in clinical rehabilitation settings for conditions such as sarcopenia, osteoporosis, tendinosis and muscle strain injuries. Moreover, the use of AR could prove beneficial in rehabilitative medicine where low metabolic demand or low perceived exertion is desirable, such as in cardiomyopathy.

Neil Chapman has embarked on a PhD project entitled “Can residual force enhancement (RFE) and activation reduction (AR) be observed in healthy and injured hamstring muscles in vivo?” He will investigate a novel method of measuring muscle length change in the hamstring muscle via the use of 3D motion capture and ultrasound; the presence and magnitude of RFE and AR in healthy hamstring muscles; and the presence of RFE and AR in damaged hamstring muscles.

It is anticipated that the results of this research will contribute to the understanding of RFE. Furthermore, it is expected that the PhDs project, once complete, will ignite future interest in investigating the application of RFE phenomena in clinical and sports performance settings.
Building Research Capacity

The practice of Registered Nurses working in rural and remote Australia

Nicola Whiteing | PhD candidate

Nicola Whiteing is currently undertaking a qualitative multiple case study exploring the practice of Registered Nurses working in rural and remote areas of Australia. These geographical areas rely on nurses as the single point of entry to health services, often in the absence of medical staff. Indeed, nurses make up the largest group in the rural and remote workforce, so communities rely heavily on them for their health care needs. In many very remote areas, the nurse may be the sole health care provider. The reality of practice in rural and remote areas can be seen to be vastly different from practice in urban or metropolitan settings, where there is generally adequate access for patients to services and greater interprofessional support.

While much research has discussed the issues affecting health care provision in rural and remote communities and the effects on their workforce, few studies have looked in-depth at the roles and responsibilities of Registered Nurses working in these locations on a day to day basis, how these roles fit within their scope of practice and what preparation nurses have had for such roles. This research aims to present evidence of the roles and responsibilities that rural and remote nurses undertake, whether the preparation for the role is considered effective for all aspects of their clinical, leadership and research role dimensions; and importantly, whether there are associated concerns regarding health service delivery and future workforce planning. Such findings are significant as they enable appropriate recommendations for the preparation of nurses working in rural and remote areas of Australia, and they influence future workforce planning and patient/client safety.
Building Research Capacity

Developing an evidence base for osteopathic healthcare

Dr Paul Orrock | HDR graduate

Dr Paul Orrock’s research over the last 7 years has been dominated by the PhD that he was awarded in 2017. This work was a close examination of the evidence base of osteopathic healthcare. Osteopathy is an international health service and osteopaths appear to utilise a range of therapeutic interventions, but there was a need for foundational research to establish a valid description of its intervention. Health practices require an evidence base to establish a scientific foundation, to provide certainty to users and third party payers, to compare to other services so users have choice, and to influence practice. The process of establishing evidence has evolved alongside the development of scientific principles, and the gold standard of evidence for healthcare is the randomised controlled trial. There are questions about whether this method is suitable for complex interventions and whether the findings reflect real-world practice.

Paul’s thesis aimed to establish the nature of osteopathic healthcare from the perspective of practitioners and patients, to review its evidence, and to develop a clinical trial methodology that could test its effectiveness. Within a philosophical framework of pragmatism, an explanatory sequential mixed methods approach was used, combining a practitioner survey and focus group, patient interviews, a systematic literature review, and a Delphi panel. Results from these studies were synthesised to create a model of osteopathic healthcare, and a pragmatic clinical trial method was developed on the basis of that model.

The model of osteopathic healthcare demonstrated that it is consumer driven and health focused, has biopsychosocial foundations, and manages patients who predominantly present with pain in multiple regions. The intervention is complex and follows a patient-centred model. This includes a primary health care assessment, individually tailored manual therapies, exercise and lifestyle advice, and cross disciplinary referrals.

The pragmatic trial method that was developed reflected this model, and was designed to test the effectiveness of osteopathic healthcare on the most common presentation, chronic non-specific low back pain. This method had broad inclusion and specific exclusion criteria, an authentic intervention package and follow up, functional outcome measures and analysis by intention to treat.

This work has so far resulted in four publications in peer reviewed journals. Paul plans to proceed with the clinical trial and to continue collaborating with other professionals who aim to test complex healthcare interventions using pragmatic clinical trials.
Research Impact

Are international rugby sevens athletes at risk of heat exhaustion?

Dr Chris Stevens

The HSBC World Rugby Sevens Series is an annual series of rugby sevens tournaments played by 24 national teams. Each team plays 5-6 matches per tournament in a two-day gala style format. Since the series is played in summer, extremely hot and humid conditions (especially in locations such as Sydney and Singapore) can have a negative influence on the performance and health of the players.

Dr Chris Stevens, Lecturer in Sport and Exercise Science from Southern Cross University, and staff from the ASPETAR Sports Medicine Hospital in Doha, assessed the core temperature of players in the Scottish team across multiple tournaments in the 2017 series. The players ingested a small, indigestible capsule with their breakfast that measures its surrounding temperature in the gastrointestinal tract, and sends the information back to a receiver by telemetry. While this technology has been around for a while, recent upgrades to the equipment have allowed data collection without the players needing to carry a receiver on their body, making these measurements possible in elite sports competitions.

In such hot conditions, the players are at risk of hyperthermia and heat exhaustion. Dr Stevens hinted that the Scottish team are at especially high risk considering that “they predominantly play in a cool environment during the off season” and they “have no plans to undertake any heat training” to prepare for the conditions.

Several players recorded core temperatures of greater than 40 degrees Celsius, which represents the criteria for exertional heat illness. This is significant considering that the games have a duration of only 14 minutes!

Future investigations within the 2018 series will assess the effects of the players using a range of cooling strategies both before and after the matches. The strategies will include wearing ice vests, immersing the body in cold water, and drinking slushies, all of which aim to minimise the increase in pre-match core temperature and maximise recovery in preparation for subsequent matches on the same day. These findings will also have application to other codes and competitions, such as Rugby 10s and Rugby League 9s.

Dr Stevens stated that while such cooling methods are now common across all of the football codes, it is unclear if they can have a significant impact on body temperatures and the prevention of hyperthermia at the elite level.
Research Impact

Enhancing learning of decision-making and assessment in midwifery

Dr Elaine Jefford

Midwifery academics need to educate students about how to undertake clinical reasoning and make subsequent decisions. Yet, in higher education in Australia and around the world, there are no standards for how to teach clinical decision-making, leading to higher education institutions being sporadic, inconsistent and insensitive to the philosophy of midwifery within the undergraduate curriculum. As a consequence, assessment and student learning in this area is unpredictable and detrimental to the student learning experience.

In 2013, the Enhancing Decision-making and Assessment in Midwifery (EDAM) framework was determined as a valid and reliable tool to assess midwives’ decision-making processes in the second stage of labour. EDAM is, however, only a measurement tool. An additional learning package is therefore needed to effectively achieve optimal teaching and learning within undergraduate midwifery education.

Dr Elaine Jefford from SCU, along with Professor Julie Jomeen from Hull University UK and Professor Colin Martin from Buckinghamshire New University, UK (both of whom are SCU adjunct Professors) have undertaken research on an online learning package. This research project builds upon existing successful and long standing international collaborations between the researchers. It was supported by funding from Mid-North Coast Local Health District and NSW Health.

In this study, recruited students will complete the EDAM (measurement) tool online using three randomised vignette scenarios from a pool of six. This will determine baseline pre-training scores. Using probability sampling, students will be randomised into two groups. One group will receive the standard teaching offered within the two higher education institutions’ education program. The other group will, in addition to standard content, undertake the online learning package (intervention). After delivery of all course content on decision-making, all participating students will again be asked to complete the EDAM tool online, using the remaining three vignette scenarios from the original pool of six. Randomisation of the vignettes is to limit potential student recall from the pre-intervention stage of the study, and ensure that any differences observed are an effect of the intervention.

The researchers will be assessing how effective the on-line learning package is in improving clinical decision-making, and how acceptable and replicable across the two teaching environments it is. They hope their findings will underpin further research to determine the relationship between the online learning package and improvements in teaching and learning outcomes.
Research Impact

A comparison of postoperative complications following foot surgery by podiatric and orthopaedic surgeons

Dr Paul Butterworth, Alex Terrill

There is currently no research from within Australia that compares complications following foot surgery performed by podiatric and orthopaedic surgeons. Postoperative complications are a significant problem for both patients and surgeons, notwithstanding the economic burden. In an Australian study, postoperative infection and venous thromboembolism added $97 million and $66 million, respectively, to total joint arthroplasty costs in the first 30 days following surgery. Postoperative complications also have adverse effects on health related quality of life, mobility, self-care and chronic pain.

Postoperative complications following foot surgery in Australia have previously been reported, the most recent study identifying low infection and delayed union rates. The aim of this study is to determine the differences and similarities between postoperative complications following foot surgery by podiatric and orthopaedic surgeons. The expected benefits are an improved understanding of the risk profile for foot surgery.

In this study, complications are recorded according to the International Classification of Diseases codes. These codes are used by both the Australian College of Podiatric Surgeons and Queensland Health (for orthopaedic surgery). Complications related to the codes are then analysed. The distributions of all continuous data will be explored and transformed as required. Independent-samples, t-tests, and chi square tests will be used to assess differences in medical comorbidities and complications in those who have undergone foot surgery in both the podiatric and orthopaedic groups. Correlation (Pearson’s r) and regression analysis will be used to determine the strength of the relationship between medical comorbidities and postoperative complications between the two groups. All analyses will be performed using the SPSS statistical package.

A better understanding of the type of complications that occur following foot surgery may help to improve outcomes for those patients undergoing foot surgery. Identifying risk factors such as length of stay and specific comorbidities such as smoking, and comparing these between two distinct specialties, is important in order to improve quality of care. While it is possible that postoperative complications between the two groups will be similar, this study may help to determine the differences between two surgical specialties and whether patients with particular risk factors are better off with one specialty over the other.
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