

FACULTY OF KINESIOLOGY AND PHYSICAL EDUCATION



ANNUAL RESEARCH REPORT 2016-2017



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PUBLICATIONS (2016-2017)	21

PUBLICATIONS SUMMARY	Count
Awards and Grants	46
Books	8
Book Chapters	19
Conference Abstracts	48
Conference Presentations	261
Intellectual Property	1
Non-Peer Reviewed Articles	42
Peer-Review Articles	130

WELCOME

Welcome to the 2016-17 Research Report of the Faculty of Kinesiology and Physical Education.

The following pages offer an overview of the innovative, impactful and promising research led by our faculty members and their trainees across a wide variety of fields that comprise the academic discipline of kinesiology. And, what a tremendously interesting, relevant and wide spectrum our discipline covers!

Our researchers' work affected communities near and far – from exploring sport for sustainable development to archiving the diversity of physical activity in the GTA and expanding accessibility of physical activity programs for low-income families.

They studied optimal protein intake for physically active youth and examined what athletes might gain from pain. They also studied the emotional, behavioural, physical and biological capabilities and limitations of human development across the lifespan, as well as performance in physically demanding occupations and high performance sports.

Earlier this year, our researchers shared their knowledge through another successful annual public symposium, focusing on the benefits of physical activity at all stages of a cancer diagnosis. And, that's just scratching the surface.

Collectively, our faculty published 130 peer-reviewed articles, 8 books and 19 book chapters this year. They secured a total of 46 research grants, contracts and awards, garnering more than 1.5 million dollars. These are exceptional funding totals for a Faculty of our size.

Our record was reflected in this year's QS World University Rankings, which placed the University of Toronto programs in kinesiology, physical education, and sport and exercise sciences sixth in the world. This important recognition is indicative of the growing global relevance of the discipline of kinesiology, and serves as further incentive for our Faculty to continue the steady progress we are making against the research capacity and research excellence priorities set out in our Strategic Academic Plan.

We are proud of our research progress, and I hope that you enjoy perusing this annual summary.

Ira Jacobs, Dean
Faculty of Kinesiology and Physical Education



MEET THE RESEARCH FACULTY



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KICK START

Sport for development at home and abroad

Robyn Smith didn't feel motivated in high school, but all that changed when she became a young ambassador for the 2012 London Olympic Games. That got her interested in looking at sport for community development, and she eventually moved to Canada from England for her undergrad degree in kinesiology and sport management. Now in her first year of the Exercise Sciences master's program at KPE, Smith is researching how youth programs in settlement service agencies in Toronto use sport and recreation as a tool to promote the integration of immigrants, refugees and second-generation youth.



"I'm looking at whether taking part in these activities actually helps youth with their integration, because we know through other research that simply taking part in sport isn't going to help with integration by itself," says Smith. "These programs have to be intentional in their design and the actual emphasis has to be on more than just playing sport."

Through interviews with youth workers, Smith has found that soccer is the most popular sport among newcomer youth. "That's one of the reasons why the guys like taking part so much, because it's a sport that they're good at." Many of the programs are aimed at teenage males, who are a very hard population to reach. But if you're offering free soccer twice a week, that's very appealing, says Smith. "They get to know the youth workers, they build relationships and we found they're more likely to access other services."

Smith hopes the youth can find a sense of belonging through these programs. "Newcomer youth experience high levels of social exclusion and we know that experiencing social exclusion when you're young has a huge impact on your life chances when you grow up."

Several time zones away, third-year PhD student Michael Dao is exploring a sport for development project called Football for All

in Vietnam (FFAV). FFAV was born out of a cooperation between the Norwegian Football Federation (NFF) and the Vietnamese Football Federation (VFF), and centres around the idea that sports, especially football, have strong transformative potential, which can provide huge benefits to the development of every child.

"The project focuses on marginalized groups and gender equity, and integrates life-skills education by implementing games and activities that address various issues, including HIV/AIDS prevention and stigma, environment protection, sanitation and personal hygiene," says Dao. "This is different from the traditional school setting and provides a different way for children to learn about issues affecting their communities."

Dao will be wrapping up his fieldwork in Vietnam in June, but already he feels grateful for the experience. "As a researcher and student I've read countless books, had many fruitful academic discussions and been immersed in a world of learning. But, honestly, you'll never really learn until you put yourself out there and include others in the research process," he says.

Assistant Professor Simon Darnell is supervisor to both Smith and Dao. Asked to explain why sport is such a promising tool for development, Darnell says that sport represents a novel approach to the ongoing

challenges of development inequalities. "The record of success of international development over the past 50 years is not particularly good, at least not in terms of making the world more fair and equitable. So why not try sport? On top of that, sport is generally seen as a fun and engaging activity that has both wide appeal and a range of benefits, from physical fitness to socialization."

According to Darnell, the best long-term impact is that many young people who come up through sport for development initiatives eventually become program leaders and officials themselves. "This 'train the trainers' approach – or cascading model – has proven effective in the field of sport for development for supporting the sustainability of such programs," he says.

As for having students research sport for development locally and internationally, he thinks it's invaluable. "It's one of the oldest criticisms of international development work – why are we aiming programs elsewhere when we have problems at home? So if we want to organize and mobilize sport to make a positive social contribution, it makes sense that we would look to do so internationally, but also in Toronto and Canada."

Published in *Pursuit* Spring 2017
by Jelena Damjanovic

PHOTO/ MR. CU



LET'S GET PHYSICAL

New website tracks the physical activities multicultural Torontonians enjoy

Everyone knows Torontonians are hockey-mad. But there are scores of sports and other physical activities that the people of this multicultural city enjoy. Now, a KPE professor has set out to catalogue and celebrate as many of these activities as he can.

Professor Peter Donnelly – along with a team of U of T researchers – has invited Toronto residents to tell him about the ways in which they are active, so he can share the information on a new website called GTAactivity.ca and track which activities thrive and which ones die out.

“We are interested in all forms of physical cultural activities, ranging from sports played in leagues to dances to daily exercises such as yoga and tai chi,” says Donnelly, who also serves as director of KPE’s Centre for Sport Policy Studies.

The website – a kind of sport-and-culture encyclopedia – features a written description of each activity, a brief history of it and where it’s practised, and photographs or video of people in Toronto engaging in it.

The site already has entries on everything from Krav Maga, an Israeli self-defence practice, to pickleball, a cross between tennis and table tennis.

Published in *Pursuit* Spring 2017
by Jelena Damjanovic

Helping expand physical activity programs for low-income families

In a bid to improve physical and mental health for thousands, researchers from the University of Toronto and the University of Alberta have joined forces to evaluate ActiveAssist – a fee-assistance program designed to help low-income individuals and families participate in physical activity and recreation programming within the City of Mississauga.

John Spence, professor and vice-dean at the University of Alberta’s Faculty of Physical Education and Recreation, initiated the project and Katherine Tamminen, assistant professor at U of T’s Faculty of Kinesiology and Physical Education, executed the third-party evaluation for the city.

As a result of their findings, Mississauga City Council has recommended expanding the program by another 2,000 spaces.

“Our research looked at the benefits of the program as well as challenges and barriers that should be addressed,” says Tamminen. “The results demonstrated that there’s great value in increasing access to this program – beyond financial support and health benefits, it provides important community connections for individuals living in low income.”

The program started in 2009 with 2,500 participants and in 2014 welcomed 12,500 participants. The city provides a credit of

\$275 per person each year to use for courses, programs and memberships at community centres – using unfilled space in existing programs.

Tamminen’s findings revealed that a portion of participants weren’t using the subsidy due to barriers, including transportation challenges, childcare issues and lack of free time. The city is now proposing that credits not used within six months be transferred to others on the waitlist.

The program could provide a model for other cities to follow – Mississauga is Canada’s sixth-largest city, where 22 per cent of households report an annual income under \$40,000.

They anticipate the program will continue to grow in the future.

“Sport and recreation are part of healthy childhood development and lifelong health,” says Tamminen.

“Now we have evidence that this program and others like it aren’t just about reducing the financial costs or increasing healthy habits, but they also demonstrate how physical activity can reduce isolation and build community.”

Published in *Pursuit* Spring 2017
by Katie Babcock



FUELING YOUNG ATHLETES

New study shows benefits of post-exercise protein

A new study has found that ingesting as little as five grams of protein after physical activity is enough to achieve a positive protein balance, which is a prerequisite for growth in healthy, active children. The study, published in the *Journal of Nutrition* in April, is the result of collaborative research between Professor Daniel R. Moore of U of T's Faculty of Kinesiology and Physical Education and his colleagues at McMaster University and the Nestlé Research Centre in Switzerland.

"The growth of bone and muscle in children is related to how their body breaks down old proteins and rebuilds new ones. In order for children to grow, the balance between synthesis and breakdown has to be positive," says Moore. "We knew that for adults to be in a positive protein balance, especially after exercise, they have to consume protein, but we didn't know if that was also the case in children and, more importantly, how much protein children might need."

The children in the study were given zero to 15 grams of protein following a bout of exercise modelled after a hockey game. After taking their blood and breath samples, the researchers determined that the children who didn't consume any protein over three hours after exercise stayed in a negative protein balance.

"This doesn't mean that they were losing muscle mass, but they weren't gaining any, either," says Moore.

On the other hand, the children who consumed just five grams of protein over three hours after exercise achieved a positive protein balance, which supports lean body mass growth. The children who consumed greater amounts had a proportionally greater increase in protein balance.

The next step for science, according to Moore, would be to determine whether the effects of ingesting protein would be the same if done right after exercise or three hours later. And, could this greater protein balance be sustained over several days or even weeks? Finding answers to these questions could translate into more accurate recommendations for the optimal growth and development of lean body mass in children with an active lifestyle.

For now, Moore suggests giving your child a snack with a bit of protein after any kind of physical activity in which energy is expended, from vigorous play to hockey practice. A protein-free sports drink or juice won't cut it, but 250 ml of milk translates into eight grams of protein – three grams more than the minimum amount of protein found to strike that positive protein balance after exercise.

"But, before you give your kids the all clear to drink chocolate milk all day, remember that exercise should come beforehand, as this will be the most important factor to stimulate growth of muscle and bone," says Moore.

Published in *Pursuit* Spring 2017
by Jelena Damjanovic

PHOTO/ SEED9



KPE scholars receive federal funding to support research

Two KPE researchers are among the nineteen scholars at the University of Toronto who collectively have been awarded almost \$5 million to support research in everything from using stem cells to fix injured hearts to creating an advanced laboratory to develop large astronomical telescopes.

Assistant Professor Tyson Beach's project on movement assessment and retraining for the prevention of musculoskeletal disorders is valued at \$498,000. Assistant Professor Katherine Tamminen's project will focus on developing the University of Toronto Sport and Performance Psychology Lab and is valued at \$153,000.

"Our government understands the important role Canada's scientists and researchers play in developing the evidence we need to make decisions that impact our environment, our health, our communities and our economy," said federal Finance Minister Bill Morneau, who announced the funds for Toronto-area universities.

The researchers are supported by the Canada Foundation for Innovation's John R. Evans Leaders Fund and the Ontario Research Fund, which are designed to help universities attract and retain the best and brightest researchers from around the world.

"I'd like to congratulate our 19 researchers and thank the Government of Canada and the Canada Foundation for Innovation for their continuing support," said Vivek Goel, U of T's vice-president of research and innovation. "As recognized leaders in their fields, this funding will help them acquire research infrastructure that is internationally competitive and enable research to be conducted that will lead to significant results for Canadians."

"Every day, our researchers are engaged in an outstanding array of research aimed at tackling real-world challenges that have the potential to benefit all of us. This funding will ensure that work can continue at the highest level."

Published in *Pursuit* Spring 2017 by Jennifer Robinson

PHOTOS/ TOP LEFT SEED9/ TOP RIGHT ARNOLD LAN



KPE RESEARCHER STUDIES WHAT ATHLETES MIGHT GAIN FROM PAIN

Torn ligaments, broken bones and muscle strains. These are just a few injuries athletes might suffer on a regular basis. So why do competitors subject themselves to such agony? What causes them to push through the pain to reach their goals?

That's exactly what Kristina Smith, a graduate student in the Faculty of Kinesiology and Physical Education, investigated in a recent study. Smith studied mixed martial arts (MMA), a hyper-explosive combat sport that involves striking and grappling.

To date, the role of pain in sport has been poorly understood, but her findings could help athletes and coaches in all sports – from hockey to marathons.

“Pain is more than a physiological experience – it's also a social and cultural phenomenon,” says Smith, who recently completed her Master's degree.

“In everyday life we usually try to avoid or manage pain. But most athletes enter into a relationship with it to understand themselves and advance their skills.”

MMA provided a unique context for studying pain – competitors inflict as much damage as possible using Muay Thai, sambo, boxing, kick-boxing and jiu jitsu.

Smith studied seven athletes over four months through interviews, observation, video diaries and recordings of training sessions and fights. Assistant Professor Katherine Tamminen, whose research focuses on sport psychology, supervised Smith's research.

Smith also trained with the fighters to experience pain first hand.

“At first I was really intimidated, but I got the hang of it and became confident in my training. I went through my own injuries, and it really helped me to understand what the fighters were going through.”

Her study suggests that beyond building self-awareness and skill progression, pain also created bonds between training partners and provided a strong support system.

“Pain is very relational, and when one individual experiences it, it is also felt among teammates and spectators,” says Professor Michael Atkinson, who is Smith's current PhD supervisor. “When others see athletes experience pain, they can relate to it at a deep level, and it can teach them how to manage it themselves.”

So, how could coaches and athletes put these findings into practice?

Smith advises taking a broader look at reactions to pain and recommends using open communication to develop fighters' self-awareness, foster trusting training partnerships and psychologically prepare athletes for competition.

“The coach at my gym would constantly talk about pain. He would model this behavior and make it okay for athletes to talk about it too. He turned it into a learning experience and this helped the athletes to grow personally and as a group.”

In the future, Smith plans to study pain in palliative care settings.

“We're really just learning about people's responses to, and uses of pain, as well as how pain is culturally constructed. People encounter pain in a full spectrum of ways. I hope to use my previous and future research to reveal more about the complex nature of pain.”

**Published online, January 2017
by Katie Babcock**

YOURS OR MINE? HOW WE HANDLE OBJECTS DEPENDS ON WHO OWNS THEM



From scissors and staplers to car keys and cell phones, we pass objects to other people every day. We often try to pass the objects so that the handle or other useful feature is facing the appropriate direction for the person receiving the item, but new research shows that we're less accommodating when it comes to handing over our own belongings. The findings are published in *Psychological Science*.

"The associations or attachments that we have with an object leak into our movements in unintended ways when we interact with them," says researcher and study author Merryn Constable of the University of Toronto's Faculty of Kinesiology and Physical Education. "The act of facilitating another person's action is somewhat inhibited when the object that we're passing is something that we own, but the effects are so subtle that they are likely to go unnoticed."

Indeed, picking up objects is such a routine part of everyday life that we don't often think about how we do it, but research shows that our actions often contain a prosocial element. When we pick up a mug, for example, we typically pick it up by the handle because that is most comfortable. But when we hand the mug to someone else, we might turn it so that the handle faces the person receiving it.

Constable and colleagues wanted to find out whether specific social factors, such as ownership, might influence this behaviour – that is, are we just as helpful when

passing our own mug as we are when passing someone else's?

In two experiments, the researchers examined passing behaviour among 42 pairs of friends. A week or two before the actual experiment, each participant received a mug to keep; the mugs varied only in their background color. The participants were told to use their mug every day, at home or at work, and to make sure that only they used it. This instruction was given to ensure that the participants would feel ownership over the mug.

For the experiment, the friends sat across from each other at a table and the experimenter placed a mug in a specific location on the table. One participant, designated the "passer," was told to pick up the mug and place it in front of his or her friend in a natural manner. In some cases, the friend receiving the mug was told to pick it up by the handle; in other cases, the friend was instructed to remain still.

The person doing the passing and the mug that was being passed both varied randomly from trial to trial. The researchers tracked the location of each participant's hand and the location of the mug using a motion-capture system.

In line with previous research, people passed the mug slightly differently depending on whether the friend was going to pick it up afterward – that is, passers rotated the handle closer to the friend's hand when they expected him or her to grasp the mug.

Interestingly, the researchers found that passers rotated the handle slightly less when handing over their own mug compared to when they handed over someone else's mug. This less helpful behaviour occurred both when they passed their friend's mug and when they passed a mug belonging to the researcher, a relative stranger.

The findings from these two studies indicate that passers seemed to help less when passing their own mug to their friend rather than helping more when passing the friend's own mug, which surprised the researchers.

"We were expecting that the effect would be related to helping more if the object that is being passed is owned by the receiver," says Constable. "It's possible the prosocial behaviour demonstrated by this group of participants was influenced by their self-interest concerning possessions."

Overall, the two experiments underscore the importance of paying attention to the social context of our physical interactions.

"These findings reveals how the subtleties of our social world can play out in how we interact physically with objects and people," Constable concludes.

**Published online, September 2016
by Anna Mikulak**

Study co-authored by Professor Tim Welsh



FACULTY WELCOMES LEADER IN MENTAL HEALTH AND PHYSICAL ACTIVITY

When Professor John Cairney left U of T's Department of Psychiatry in 2007, he would never have predicted that his research would eventually lead him back to U of T nine years later – this time to the Faculty of Kinesiology and Physical Education.

His journey has led him from studying adult mental health to motor coordination problems in children, and his combined expertise is set to help children improve their physical and mental health.

“We’re interested in how motor coordination problems prevent children from being physically active,” says Cairney, who joined the Faculty in July from McMaster University’s Department of Family Medicine. “Children with motor coordination problems are more likely to be overweight and obese than their peers and have higher rates of depression and anxiety. At the most basic level it affects their ability to play and interact with other children, and the consequences of physical inactivity are lifelong.”

Previously known as “clumsy child syndrome,” children with the Developmental Coordination Disorder not only have difficulty playing sports, but also struggle with everyday activities like tying their shoelaces, riding their bikes and writing. In 2015 Cairney published the book *Developmental Coordination Disorder and Its Consequences* to explain the disorder.

“The exciting thing from my perspective is that we’re leading the field in this area. These children have been invisible and we’re bringing international attention to them.”

Cairney has an impressive track record of high-quality publications and sustained external funding. From 2005 to 2008 he was awarded the Canada Research Chair (Tier II) in U of T’s Department of Psychiatry and in 2015 the McMaster Family Medicine Research Chair.

“In Professor John Cairney we have found exactly what we were seeking, a scientist who is recognized around the world for his experience and expertise in building highly

PHOTO/ JING-LING KAO-BESERVE

successful multi-disciplinary research collaborative networks,” says Professor Ira Jacobs, dean of the Faculty.

And the respect is mutual.

“I felt that the number of new recruits and the focus on intensive research here makes it an exciting place to be. There’s also the diversity of the population in Toronto and the opportunity to work with the Faculty’s co-curricular programs.”

In the future, Cairney plans to design community-based interventions to help children with Developmental Coordination Disorder increase their physical activity and social participation. “We have a lot of information about the consequences of the disorder, but there are remarkably few interventions. That’s where physical literacy comes in. No two children are alike and we want to create accessible programs that will translate into long-term physical activity participation.”

In addition to his research, Cairney is the editor in chief of the journal *Current Developmental Disorders Reports* and the incoming president of the North American Society for Pediatric Exercise Medicine.

He’s also a baseball fanatic and author of *Immaculate: A History of Perfect Innings in Baseball*. The book features statistics, history and the human side of the sport. “What makes sport interesting to most is the major achievements, but I’m interested in the journey – there are always challenges that athletes have had to overcome.”

And overcoming challenges is what Cairney hopes his work will do for children – improving their physical, social and mental health.

“I think that this Faculty can become an international centre of excellence for physical activity and mental health studies, and I see the work that I do as part of that.”

Published in *Pursuit* Fall 2016
by Katie Babcock



DEAN IRA JACOBS NAMED FELLOW OF THE CANADIAN ACADEMY OF HEALTH SCIENCES

Professor Ira Jacobs, dean of the Faculty, is among eight University of Toronto researchers who were named fellows of the Canadian Academy of Health Sciences (CAHS) this year.

Considered one of Canada’s most esteemed academies, CAHS provides assessments and recommendations on issues affecting the health of Canadians. CAHS fellows have a history of outstanding performance in the academic health sciences, and election to fellowship in the Academy is considered one of the highest Canadian health sciences honours.

“I am surprised and feel very honoured for the recognition of my research, and I’m flattered and humbled to be in the company of so many esteemed colleagues from the University of Toronto and from across the country,” said Professor Jacobs. “I have been very fortunate over the years to have had significant and productive collaborations with talented scientists and, in particular, very creative graduate students who have definitely taken me outside of my scientific comfort zone.”

Professor Jacobs is the first member of KPE to be inducted into the Academy. There are only a handful of others from other universities that also have kinesiology as their primary affiliation, and he sees this as an important acknowledgment of kinesiology as an academic discipline that is integral to improving and sustaining the health of Canadians through physical activity.

Published in *Pursuit* Fall 2016
by Jelena Damjanovic

REDEFINING LIFTING TECHNIQUE

HOW BIOMECHANICS RESEARCH CAN HELP PREVENT LOWER BACK INJURY

For the past 20 years, Professor Tyson Beach has painstakingly analyzed the movements of factory and health-care workers, emergency responders and athletes to discover what limits performance and causes injuries.

In his most recent research, Beach, Professor David Frost and their graduate students are applying what they've learned about biomechanics and ergonomics to help firefighters, paramedics and caregivers prevent lower back injuries. These workers are often required to lift heavy objects and are at high risk for developing painful and disabling lower back conditions.

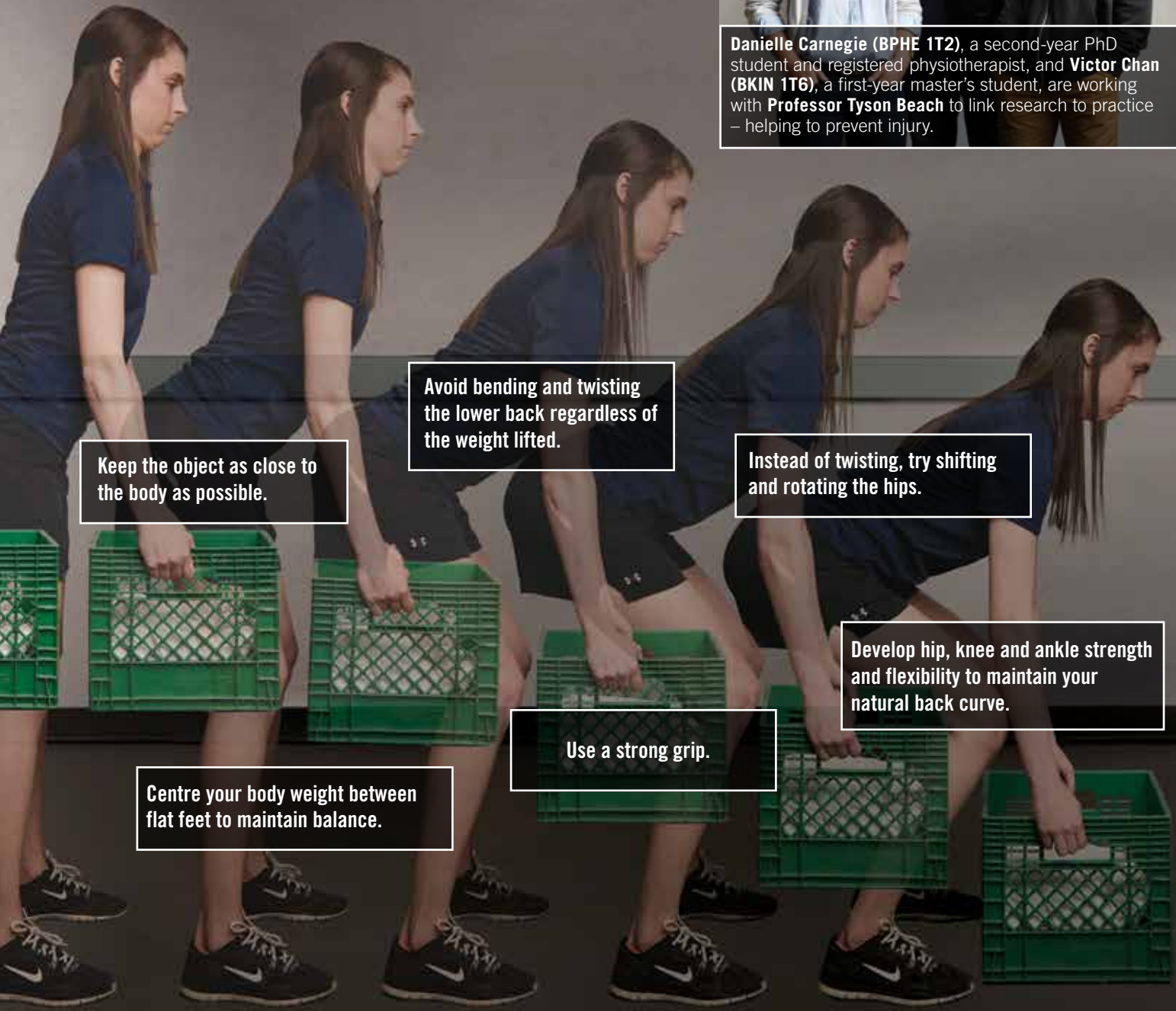
“Through biomechanical and epidemiological research, we understand many of the factors that make lifting hazardous for lower back health. Now, we’re studying how to best get workers to identify and eliminate the hazards through training,” says Beach. “The advice ‘bend with your knees, not your back’ has proven ineffective. We need a more comprehensive and interdisciplinary strategy.”

The team shared their top tips for safe and effective lifting:

Wherever possible, modify lifting tasks and environments:

- Reduce the weights, speeds and sizes of objects lifted.
- Progressively increase weights and speeds of lifts at the gym.
- Regulate the number of lifts performed each day.
- Eliminate physical obstacles that force the body into awkward positions – don't store frequently accessed objects on low-lying shelves!
- Avoid lifting for approximately 30 minutes after prolonged sitting, standing or lying down, because spinal tissues need time to recover.





Keep the object as close to the body as possible.

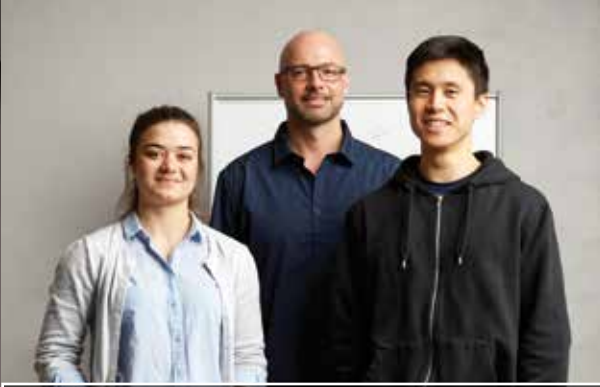
Avoid bending and twisting the lower back regardless of the weight lifted.

Instead of twisting, try shifting and rotating the hips.

Develop hip, knee and ankle strength and flexibility to maintain your natural back curve.

Use a strong grip.

Centre your body weight between flat feet to maintain balance.



Danielle Carnegie (BPHE 1T2), a second-year PhD student and registered physiotherapist, and **Victor Chan (BKIN 1T6)**, a first-year master's student, are working with **Professor Tyson Beach** to link research to practice – helping to prevent injury.

EX/Cancer

The benefits of exercise after a cancer diagnosis

BY JELENA DAMJANOVIC AND KATIE BABCOCK

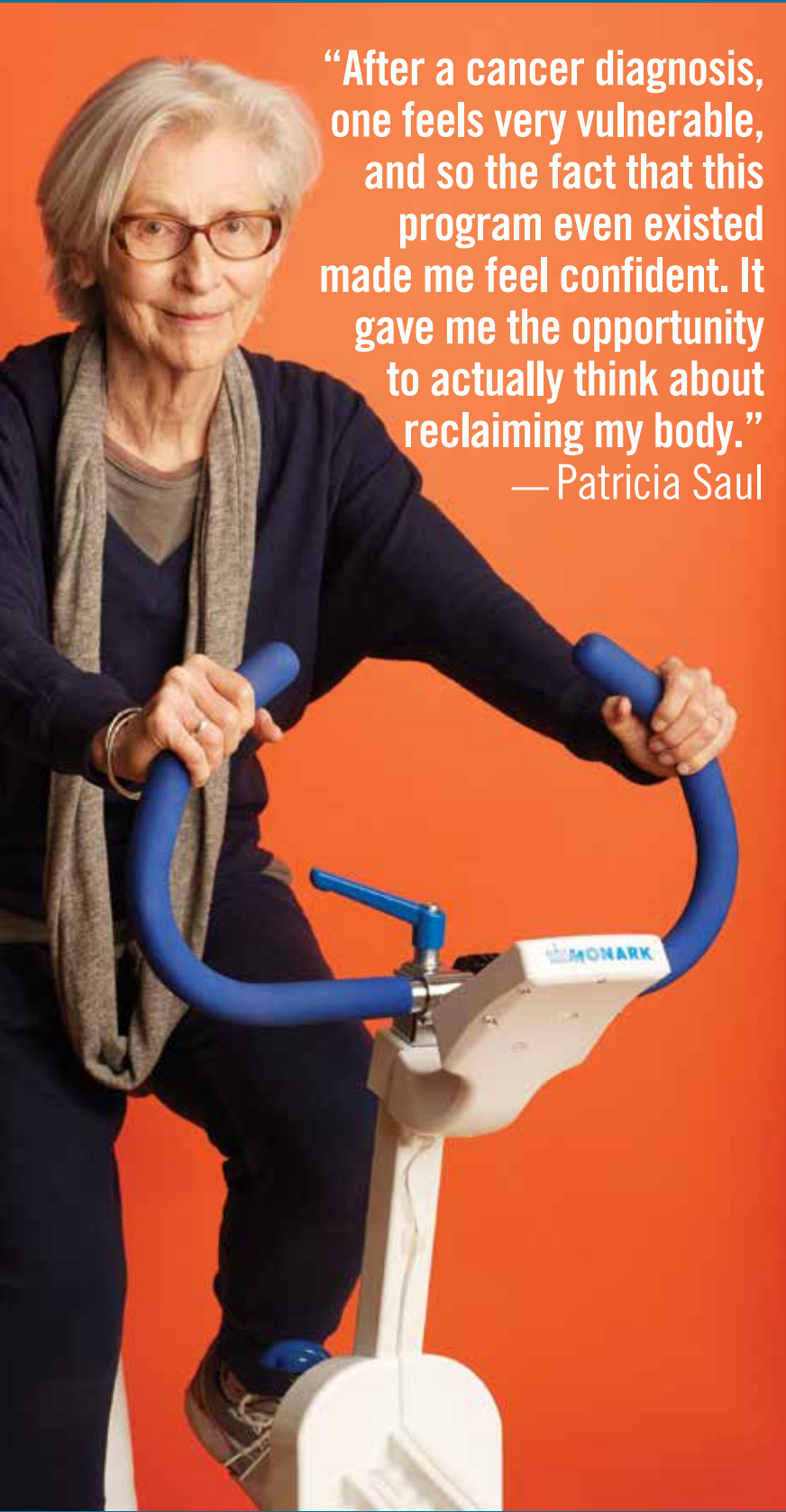
PHOTOGRAPHY BY SEED9

At eighty years old, Patricia Saul describes her lifestyle as active. A former teacher, she remains involved in two different youth programs, and her four grandchildren keep her busy. Living in a duplex ensures she gets in plenty of steps during the day. But it wasn't until her breast cancer diagnosis in 2014 and subsequent mastectomy that she began to exercise in earnest.

Saul was a patient in the Princess Margaret Cancer Centre when she was told about the Cancer Rehabilitation and Survivorship Program (CRS) for survivors at all stages of their cancer journey. The program is built on principles of self-management and adoption of a healthy lifestyle, including exercise, rehabilitation and psychosocial support to help survivors living with late and long-term effects of cancer treatment.



EX/CANCER

A photograph of Patricia Saul, an elderly woman with short grey hair and glasses, wearing a dark blue long-sleeved shirt and a grey scarf. She is smiling and looking towards the camera while standing on a white and blue Monark stationary bike. The bike has 'MONARK' written on the front console. The background is a solid orange color.

“After a cancer diagnosis, one feels very vulnerable, and so the fact that this program even existed made me feel confident. It gave me the opportunity to actually think about reclaiming my body.”
— Patricia Saul

“It made an enormous difference to me,” says Saul. “But it wasn’t until after the surgery that I was introduced to Darren and that we started regular meetings over a year-long period.”

Darren Au is a first-year PhD student in the Exercise Science program in U of T’s Faculty of Kinesiology and Physical Education. He is one of the kinesiologists working with the Faculty’s Assistant Professor Daniel Santa Mina at Princess Margaret Cancer Centre to help develop exercise programs for cancer survivors. The interprofessional team also includes doctors, physiotherapists, occupational therapists, psychologists, dieticians and social workers.

“We go through the participants’ health history and we chat about their short- and long-term goals, and then we tailor exercises to help them reach those goals. Ultimately, we want them to get in the condition they were in before being diagnosed with cancer, before the treatment,” says Au.

Au says no one cancer journey is the same, so the exercise programs need to be individualized.

“Some people may go through chemotherapy, radiation, surgery or all three. We tailor the exercises around the side effects of these treatments, to help rehabilitate the impairments that may come from them.”

Saul was prescribed home-based exercises, but met with Au at the ELLICSR: Health Wellness and Cancer Survivorship Centre five times throughout the year for follow-up. She would get a fitness assessment to track how well she was doing, review her exercises and make changes as needed.

One of the challenges for Saul was that she had never done anything like this before.

“I’ve never belonged to a gym,” she says. “After a cancer diagnosis, one feels very vulnerable, and so the fact that this program even existed made me feel confident. It gave me the opportunity to actually think about reclaiming my body.”

But she did find it challenging, telling Au that she just couldn’t do an exercise or that there were too many of them. So Au would cut them back and modify them to make them work for her.

“By the time I was finishing the program, we were concentrating on five different exercises out of ten. I’m not sure I ever did them particularly well, but I did them. So, for me the program not only offered an opportunity to set some physical goals, but also was very hopeful and I felt that I had some control.”

Assistant Professor Santa Mina is the appointed Scientist and Exercise Lead for the CRS Program guiding exercise-specific programming and research. He says there is a lot of evidence that point to the protective and/or ameliorative effects of exercise across the cancer continuum.

“Evidence is stronger in some cancers than it is in others. In breast, colon and endometrial cancer, the evidence is strong that routine physical activity can reduce the risk of developing cancer by up to 30 per cent. For other cancers, the data is still emerging, but there are a number of suggestions that exercise as part of an overall healthy life style can reduce the risk associated with developing many cancers.”

Unfortunately, even those who are most active may still end up with a cancer diagnosis. For them, the benefits of exercise start immediately following the diagnosis, says Santa Mina.

“We are starting to unravel a whole area of research called prehabilitation, and that’s the role of exercise prior to treatment. We know that exercise benefits those who are about to undergo surgery for cancer, but we’re starting to explore how exercising prior to a particular type of treatment, like chemotherapy, might impact tolerance of that treatment and the associated outcomes.”

The benefits of exercise are not limited to just the pre-treatment phase, but also manifest during, immediately following, and a number of years after treatment.

“There are a number of late effects of cancer that may not present at the time of diagnosis and treatment, but because some of these treatments are so harsh, years down the road they can come up and become quite problematic. Exercise is a great strategy to try to mitigate those if they do arise.”

But Santa Mina cautions the benefits of exercise only last as long as the exercise persists. As exercise drops off, the benefits tend to drop off as well. So it’s important to monitor progress, continually adapt and stay engaged in the behaviour so that the benefits that accompany exercise can be sustained.

In 2015 Cancer Care Ontario provided exercise guidelines for people with cancer, and that has been a landmark achievement, says Santa Mina. However, evidence suggests that only about 25 to 33 per cent of those who are diagnosed with cancer are meeting the physical activity guidelines.

The barriers vary broadly, from very pragmatic issues, such as commuting to the place of exercise to feeling self-conscious about having low energy and a changed appearance after treatment. Time is another constraint, and in addition to work and family, cancer patients also have to factor in treatments and doctor appointments.

“The patients’ experience of the treatment fluctuates all the time, and we need to accommodate the variety of limitations they may experience,” says Santa Mina.

Professor Catherine Sabiston is also an expert in the field of physical activity and cancer at KPE. Based on long-term research following natural changes in exercise patterns among breast cancer survivors, she has been able to identify when exercise is at its lowest following treatment, and why. One main reason for low exercise relates to limited social support.

In 2014, Sabiston launched ActiveMatch (www.activematch.ca), an online community designed to help women diagnosed with cancer connect with an exercise partner.

“Many women told us that they don’t exercise because they don’t have an exercise partner. Now women can find their near-perfect exercise match online.”

Currently, 140 participants are enrolled in the program and Sabiston plans to extend it across Canada.

“We’re setting people up for success because they’re building self-efficacy and they can set their own goals. In turn, this exercise and social support helps to improve mental health and well-being.”

And there are other things that can be done to make this population more active.

“What comes to mind first is awareness,” says Santa Mina.

“Do clinicians and patients know that exercise has been demonstrated as safe and effective for individuals with cancer? Changing the culture to one where we exercise someone rather than bed rest someone takes a bit of time, but it’s happened in cardiology and it can happen in cancer care, too.”

Santa Mina believes building awareness and sharing research will lead to more programs – ideally with staff who are trained to work with people who have been diagnosed with cancer.

“It’s only in the last five to 10 years that credentials have been developed to provide people proficient in exercise physiology with an oncology background,” he says.

Since completing her exercise program with CRS, Saul has joined the gym at the Athletic Centre at U of T, much to Au’s delight.

“Being a part of the program was great because it made me hopeful about the future,” says Saul. “One of the hardest things is to keep on keepin’ on after the formal program ends. I joined the Athletic Centre to do just that, but for many that would not be an option. ActiveMatch could provide people with an additional tool to keep on going.”

Au was on his way to his office when he bumped into Patricia going to the gym. “It was such a pleasant surprise and it made me feel so great, because when I see participants taking on the initiative to exercise on their own, it gives me a boost in what I do,” says Au.

On April 6, the Faculty hosted its annual research symposium featuring Professors Santa Mina and Sabiston. The symposium focused on the benefits of exercise after a cancer diagnosis and offered evidence-based strategies to start and stick with manageable exercise programs.

Tips for exercising after a cancer diagnosis

Take small steps: do a little bit more today than you did yesterday, and set personal goals that you can attain. You can also start by focusing on reducing sedentary behavior (e.g., sit a little less today than you did yesterday).

- 1. Find simple ways to get active.** Walk down the hall in your condo, use the stairs and stand more during the day.
- 2. Find social support.** Having someone to keep you accountable is a known strategy for successfully sticking to an exercise routine.
- 3. Keep track of what you do throughout the day.** Acknowledge small successes and achievements. This will promote feelings of confidence.
- 4. Choose physical activities that you enjoy.** You can gain tremendous benefits in mental and social health from lighter intensity exercise.



SCORING GOALS FOR DEVELOPMENT?

Will hosting the Pacific Games be a nation-building boon for the Solomon Islands?

Terry, a senior player for the China Town AFL team winds up for a kick at the Lord Howe Settlement, Honiara. Photo taken by Irene Scott for AusAID.

Developing countries like the Solomon Islands would do well to think carefully about the supposed benefits of hosting major sporting events, Simon Darnell writes in Policy Forum. Darnell is Assistant Professor in the U of T Faculty of Kinesiology and Physical Education with a special interest in sport for development and peace.

In March of 2017, the Solomon Islands Parliament passed a legal framework enabling the country to host the 2023 Pacific Games. Speaking to the legislation, Deputy Prime Minister and Minister for Home Affairs Manasseh Maelanga stated that the hosting of the Pacific Games would support the goals of 'economic development and nation-building.'

In this way, Maelanga situated the Solomon Islands' strategy within the recent trend whereby peripheral and emerging countries, particularly in the global South, pursue the hosting of major sports events as part of their development strategies and policies. The Solomon Islands' efforts suggest that even relatively small events like the Pacific Games, while clearly on a different scale from sports mega-events like the Olympic Games or the FIFA World Cup, are now connected to development strategies and policies.

So, will such a strategy work? On the one hand, for a country like the Solomon Islands hosting an event like the Pacific Games, some benefits are likely to accrue. For example, hosting can improve a nation's international prestige, while securing its place within the global community. In this sense, hosting yields some positive effects in terms of soft power; if a nation cannot compete economically or militarily, building a reputation through sport often offers an attractive alternative.

Hosting events also has benefits in terms

of infrastructure. It is common for government funding to 'open up' after a Games have been awarded, in order to build new facilities – both sporting and otherwise – and to facilitate tourism. In turn, hosting events can have a positive impact on a nation's elite sport system, especially as the host country channels resources towards its athletes to ensure they perform well at home and avoid embarrassment.

On the other hand, however, recent forays into hosting by emerging countries suggest the need for caution regarding the efficacy of such strategies. Several issues are worthy of critical reflection. First is the issue of the cost overruns that almost always accompany the hosting of major sports events, as well as the opportunity costs associated with such spending. It is simply a fact that the hosting of major sports events almost never come in on budget, leaving host cities and/or countries scrambling to find extra money. This is particularly the case given that it is nearly impossible to abandon a commitment to hosting a Games once planning and construction have begun.

In turn, when compared to more economically stable countries, developing or emerging nations are often in a more precarious position to deal with such challenges, particularly if there are other social services that are also in need of funding.

Second, and relatedly, is the question of inequality. While hosting of events does often lead to investment and growth, this economic activity usually takes place primarily within the private sector, as contractors and corporate sponsors often drive the Games. In this way, hosting of sports events can facilitate the transfer of public funding into private hands, which likely exacerbates inequality rather than challenging it.

Third is the issue of environmental and social impacts. In the face of climate change and environmental degradation, building sports facilities for short-term use and hosting international tourism events that rely on cheap fossil fuels may be a dubious strategy at best. Of course, advocates of hosting point to the legacies that such events can inspire, arguing that new sports facilities and sporting heroes will lead to a nation of sports participation, with positive impacts in terms of health and wellness.

On the contrary, if the goal is to create a sporting nation, the hosting of sports events is not a particularly good policy. Indeed, research into sport policy suggests that the 'demonstration' effect of hosting does little to encourage sustained sport participation among the host country's population. This is because even if citizens feel inspired by watching their nation's athletes, this has little direct impact on the availability of facilities or of qualified coaches that can introduce people to sport.

Indeed, there is a strong argument to be made that the determining factor with regards to broad-based sport participation is social equality, rather than sport events and their inspirational effects. In other words, physically active populations tend to be ones that are more equal, not more inspired.

Overall, then, while it continues to make some sense within the logic and structures of competitive capitalism and globalisation for peripheral or emerging countries to pursue the hosting of major games as a development strategy, the track record of such pursuits suggests that countries might want to think twice about whether such strategies are the best use of limited resources.

Published online, May 2015 by Simon Darnell



Undergraduate student Darrin Wijeyaratnam
with Assistant Professor Ashley Stirling

RESEARCHERS CREATE FIRST CANADIAN GUIDELINES FOR OPTIMAL INTERNSHIPS

In today's ruthless job market, internships often give students a competitive edge. But what makes for a valuable experience? And how do you measure success? Researchers from the Faculty are addressing these long-overdue questions with Canada's first post-secondary internship guidelines.

It's a development that could help thousands of students get the most out of their experience – an estimated 300,000 interns hit Canada's job market each year.

Under the Employment Standards Act, 2000, the Ontario Ministry of Labour provides legal guidance for placements, but the quality can vary dramatically. Students could learn valuable lessons each day, or they could learn how everyone takes their coffee.

"In the past there has been a great deal of attention focused on the length of internships and the amount of pay, but the more critical question that we should be asking is whether students' experiences are educational," says Assistant Professor Ashley Stirling, who is the Faculty's director of experiential education and the project lead. "Now we have clear, universal recommendations to most effectively enhance student learning and

development."

The recommendations set out in A Practical Guide for Work-integrated Learning, are based on the most current research and could be applied to any type of internship around the world, including placements, co-op programs, field experiences and work study.

To create the guidelines, the team consulted with the Higher Education Quality Council of Ontario and a 22-member advisory committee with representatives from colleges and universities across Ontario. They conducted focus groups at 11 post-secondary institutions with more than 100 faculty and staff.

What makes for an optimal internship? The guide outlines a concrete structure featuring explicit learning outcomes, hands-on practice, analysis and the opportunity to test new skills and ideas.

"Ideally, an internship should let students participate in real-world work activities and contribute to the organization in a meaningful way," says Stirling. "They also need appropriate opportunities to practice, be challenged and receive constructive

feedback. It's important to integrate practice with theory to get the best results."

This integrated learning model has been a key part of the Faculty's professional placement program. For over 15 years, students have taken lessons learned in the classroom and applied them to their professional placements. Last year more than 200 students completed their designated 100 hours of practice at organizations including the Canadian Sport Institute of Ontario, the Boys and Girls Clubs of Greater Toronto, Upper Canada College and the Hospital for Sick Children.

"The saying 'every experience is educational' is inaccurate. While there may be something to be learned from every experience, it doesn't mean that each experience provides the optimal conditions for learning," says Stirling. "We hope these guidelines will provide higher education leaders with the tools to enhance how they deliver internship programs – the end goal is to provide students with the best educational experience possible."

Published in *Pursuit* Fall 2016
by Katie Babcock

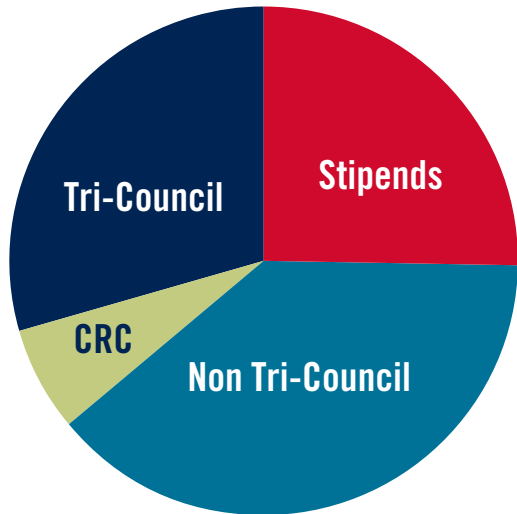
KPE RESEARCH FUNDING AWARDED – 2016-2017

Investigators	Sponsor	Program	Title of Research Project	Awarded
K. Arbour-Nicitopoulos Co-PI: K. Martin Ginis	McMaster University	Operating Grant	Enhancing Community Participation in Canadians with Physical Disabilities: Development, Implementation and Evaluation of a Partnered Strategy	2,400.00
K. Arbour-Nicitopoulos Co-PI's: K. Martin Ginis, G. Faulkner, A. McPherson, V. Wright, & A. Allison	SSHRC	Operating Grant	Exploring the Acceptability of Inclusive Recreational Sports Programs for Children with Physical Disability	42,762.00
K. Arbour-Nicitopoulos	SSHRC SIG Award	Operating Grant	A Canadian Workshop on Brief Action Planning Skills	2,530.00
T. Beach	Connaught Fund	Operating Grant	Biomechanical Analyses of Single-leg Squat Variations – Implications for Lower Extremity Injury Risk Assessments	9,987.50
T. Beach Co-PI: D. Frost	Regional Municipality of Peel	Operating Grant	Towards the implementation of a "daily movement practice" initiative to enhance and maintain the musculoskeletal health and performance of Peel Region paramedics - A proposal to assess perceived implementation barriers and facilitators	17,666.67
T. Beach Co-PI's: A. Stirling, D. Frost, & G. Kerr	University of Waterloo	Operating Grant	Evaluation of the Occupational Health Clinics for Ontario Workers Inc. (OHCOW) Training Guidelines for Low-back Injury Prevention in Paramedics	8,680.00
J. Cairney Co-PI's: M. Kwan, & H. Clark	SSHRC	Operating Grant	Youth Sport Participation: A Survey Measure of Youth Sport Experience	26,282.00
S. Darnell	Ministry of Research and Innovation	Early Research Award	Using Participatory Action Research to Understand Sport and Social Development in Toronto, Ontario	28,151.76
S. Darnell Co-PI's: P. Donnelly, & P. Kingston	SSHRC	Operating Grant	Sport and Sustainable Development: Setting a Research Agenda	17,675.00
I. Jacobs	NSERC USRA	Summer Students	Undergraduate Student Research Awards	4,500.00
G. Faulkner Co-PI: E. Antunes	CIHR Award	Scholarship	Active Canada 20/20: Evaluating a Population Approach to Reducing Physical Inactivity in Canada	182,090.00
C. Fusco Co-PI's: T. Blanchette, P. Hubbard, & M. Silk	Bournemouth University Higher Education	Operating Grant	Sex Work in the Context of Sports Mega Events: Examining the Impacts of Rio 2016	7,014.40
C. Fusco Co-PI: T. Blanchette	SSHRC	Operating Grant	Economies of Deviance: Sex Work & the Sport Mega-Event	4,216.56
J. Goodman	Active And Innovative Inc.	Research Contract	A Randomized, Placebo-controlled Double-blinded Clinical Trial of Over-the-counter Non-pharmacological Topical Analgesics MuscleCare™ and Voltaren® for Myofascial Pain	4,375.00
J. Goodman	CIHR Award	Fellowship	L. J. Banks (Student) - Cardiac Consequences of Excessive Exercise	55,000.00
J. Goodman	CIHR Award	Fellowship	K. D. Currie (Student) - Vascular-Ventricular Coupling: Influences of Age, Sex, and Fitness Level	55,000.00
M. Hutchison	Queen's University	Research Contract	Understanding Concussion: From Injury to Return-to-Action	226,447.53
M. Hutchison Co-PI's: C. Sabiston, K. Tamminen, & G. Faulkner	SSHRC	Operating Grant	The Athlete Aging Project: A Comprehensive Investigation of Long-term Psychological, Social, and Physical health	31,886.00
M. Hutchison Co-PI's: D. Richards, & S. Thomas	Steve Moore Foundation	Operating Grant	A Randomized Control Trial to Investigate Post-Acute Exercise Compared to Rest Following Sport-Related Concussion	4,000.00
G. Kerr Co-PI: A. Stirling	Coaching Association of Canada	Operating Grant	Investigating the Barriers and Facilitators to Achieving NCCP Certification	10,000.00
M. MacNeill	CIHR Award	Doctoral Stream Award	D. Kriger (Student) - The Fat Body: Making Sense of Blame, Shame & Stigma in Public Health	35,000.00
D. Moore	Ajinomoto Co., Inc.	Operating Grant	Re-evaluation of Protein Requirements in Endurance Athletes	49,856.00
D. Moore	CIHR Award	Fellowship	J. Gillen (Student) - High-intensity Exercise as a Countermeasure to Inactivity-induced Anabolic Resistance and Metabolic Dysregulation in Healthy Adults	15,000.00
D. Moore	Ministry of Research & Innovation	Infrastructure	High Performance Muscle Metabolism Suite	54,249.00

Investigators	Sponsor	Program	Title of Research Project	Awarded
D. Moore	Connaught Fund	Operating Grant	Novel Methods to Study Protein Metabolism in Humans	4,000.00
D. Moore	Iovate Health Sciences Inter Inc	Research Contract	The Effect of Post-exercise Protein Supplementation on Whole Body Protein Anabolism and Acute Performance Recovery	27,985.00
D. Moore	NSERC	Operating Grant	Mechanisms of Human Skeletal Muscle Remodelling with Exercise	29,000.00
C. Sabiston	CIHR Award	Banting Postdoctoral Fellowship	S. Balish (Fellow) - More Than A Feeling? Testing an Intuitionist Model of Sport Motivation	70,000.00
C. Sabiston	CIHR - Grants	Operating Grant	Lifestyle Activity and the Promotion of Emotional Well-being, Biological Functioning, and Physical Health Among Breast Cancer Survivors Over Time	82,412.00
C. Sabiston	Canada Research Chair	CRC Tier II	Canada Research Chair in Physical Activity and Mental Health	100,000.00
C. Sabiston Co-PI's: J. Vallance, J. Tomasome, E. McGowan, K. Karvinen, J. Jones, G. Faulkner, J. Brunet, & K. Campbell	Canadian Breast Cancer Foundation	Operating Grant	Improving Physical Activity and Reducing Sedentary Behaviour Among Breast Cancer Survivors: MOVING research to practice	108,001.00
C. Sabiston	Canadian Cancer Society Research Institute	William E. Rawls Prize	Early Career Award in Cancer Control	20,000.00
C. Sabiston Co-PI's: P. Crocker, D. Conroy, & S. Balish	SSHRC	Operating Grant	Body-related Self-conscious Emotions and Sport Participation Among Adolescent Females	11,516.00
C. Sabiston Co-PI's: J. Brunet, S. Balish, & B. Sylvester	SSHRC	Operating Grant	Keeping Girls in Sport: Efforts to Reduce the Impact of Body Image and Weight Commentary on Disengagement and Drop-out	42,326.00
C. Sabiston Co-PI's: D. Santa Mina, & A. Matthew	KPE Internal Research Grant	Operating Grant	If We Build It Will They Play? Pilot Feasibility Study of a Sport Training Program for Testicular Cancer Survivors	9,154.00
D. Santa Mina	Connaught Fund	Operating Grant	Mixed-Modality, High-Intensity Exercise for Men with Prostate Cancer on Active Surveillance	10,000.00
D. Santa Mina Co-PI's: S. Alibhai, & C. Sabiston	Movember Canada	Operating Grant	Intense Exercise for Survival among Men with Metastatic Castrate-Resistant Prostate Cancer (INTERVAL – MCRPC): A Multicentre, Randomized, Controlled, Phase III Study	4,771.96
K. Tamminen	Ministry of Research & Innovation	Early Researcher Award	Improving Emotion Regulation and Coping Among Youth Sport and Competitive Athletes	34,407.72
K. Tamminen	Trillium Foundation	Operating Grant	ActiveAssist Program Evaluation	6,864.00
K. Tamminen	University of Alberta	Operating Grant, SSHRC Subgrant	Stakeholders' Views of Barriers, Challenges, and Opportunities in Using Research Evidence to Inform Youth Sport Policy and Delivery	8,100.00
S. Thomas	CIHR Award	Doctoral Research Award	A. Bonsignore (Student) - Cardiac-oncology Rehabilitation Exercise for Breast Cancer Survivors with Reduced Cardiac Function (CORE Study)	35,000.00
S. Thomas Co-PI's: P. Oh, D. Richards, & J. Goodman	Canadian Society for Exercise	Operating Grant	Evaluation of the Get Active Questionnaire for Adults	4,266.00
L. Tremblay	NSERC	Operating Grant	Real-time Multisensory Utilization During the Different Online Control Phases of Voluntary Actions	24,000.00
L. Tremblay	NSERC	Operating Grant	Optimizing Performance by Stabilizing Physiological Oscillation Patterns	24,178.00
T. Welsh	NSERC	Operating Grant	The Processing of Nonhuman Animal Bodies and Point of Gaze	28,000.00
T. Welsh Co-PI's: C. Sabiston, & V. Taylor	SSHRC	Operating Grant	Beauty is in the Eye (and Body and Brain) of the Beholder: Identifying and testing predisposing body	14,568.00

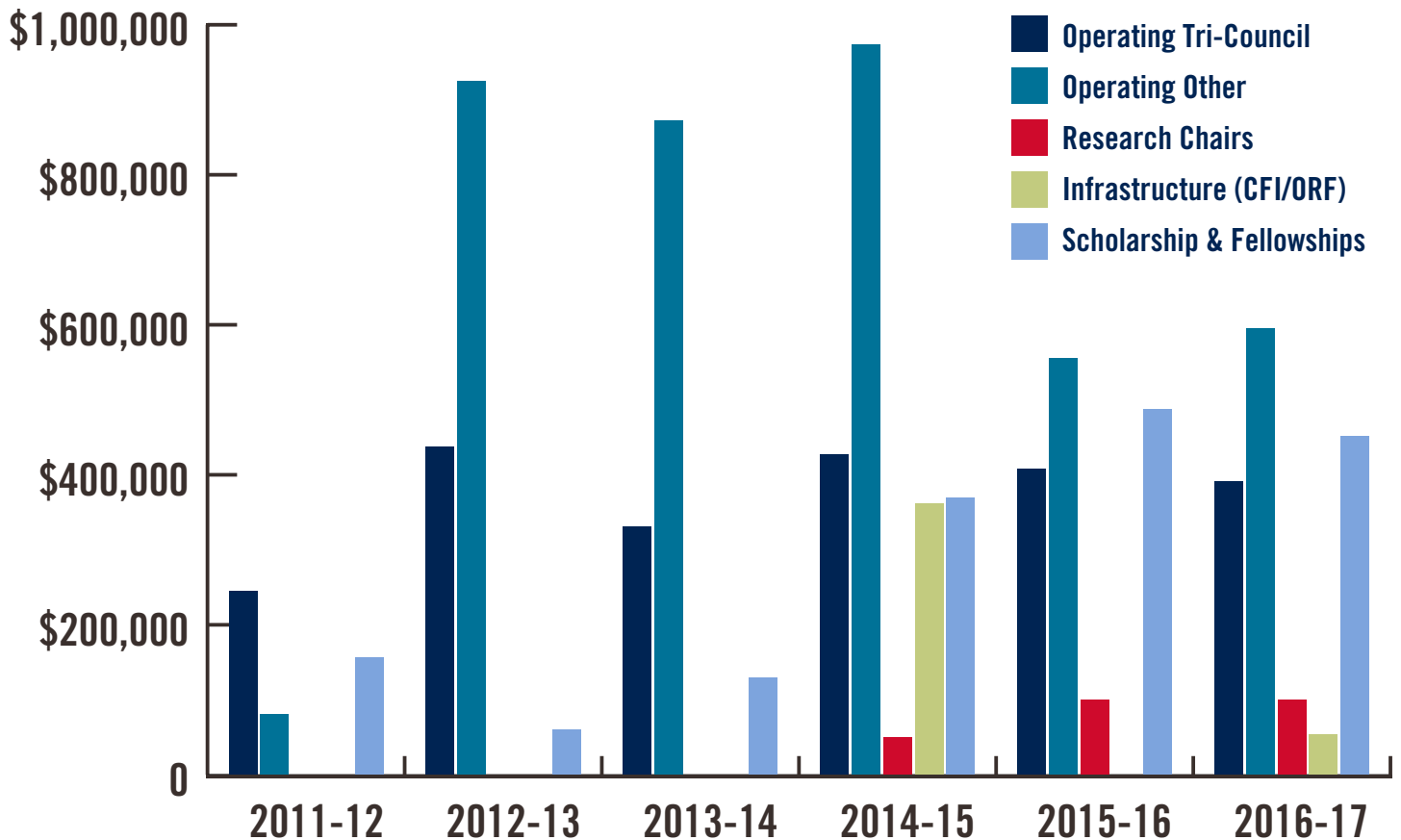
Source: RIS Award Report by Sponsor, April 1, 2016 to March 31, 2017. RIS Data as of April 27, 2017, Faculty of Kinesiology & Physical Education
Co-Pi = Co-applicants and/or Collaborators

2016-2017 Sources of Funding



Non Tri-Council	\$595,628.54
Stipends	\$451,590.00
Tri-Council	\$391,851.56
CRC	\$100,000.00
Total	\$1,539,070.04

Research Funding by Year



Source: RIS Award Reports by Sponsor, Non-prorated, RIS Data as of April 12, 2016.

PUBLICATIONS (2016-2017)

Sorted alphabetically by first listed KPE faculty member and does not include accepted or in press publications

Books (8)

Kowalski, K., McHugh, T., Sabiston, C. M., & Ferguson, L. (2017). *Qualitative, Quantitative, and Mixed Methods Textbook in Kinesiology*. Oxford, UK: Oxford University Press.

Shephard, R. J., & Tudor-Locke, C. (2016). *The Objective Monitoring of Physical Activity: Contributions of Accelerometry to Epidemiology, Exercise, Science and Rehabilitation*. Switzerland: Springer Publishing.

Bouhlel, E., & Shephard, R. J. (2016). *Optimizing Physical Performance During Fasting and Dietary Restriction: Implications for Athletes and Sports Medicine*. Boca Raton, FL: CRC Press.

Shephard, R. J. (2017). *Physical Activity and the Gastro-Intestinal Tract: Responses in Health and Disease*. New York, NY: Routledge.

Shephard, R. J. (2017). *Physical Activity and the Visceral Organs*. London, UK: Routledge.

Shephard, R. J. (2017). *A History of Health and Fitness: Implications for Policy Today*. New York, NY: Springer.

Stirling, A., Kerr, G., Banwell, J., MacPherson, E., & Heron, A. (2016). *A Practical Guide for Work-Integrated Learning: Effective Practices to Enhance the Educational Quality of the Structured Work Experience Offered through Colleges and Universities*. Toronto, ON: Higher Education Quality Council of Ontario/ Education at Work Ontario.

Stirling, A., & Kerr, G. (2016). *Advancing Women in Coaching. Mentee and Mentor Workbooks*. Ottawa, ON: Coaching Association of Canada/Status of Women Canada/Canadian Association for the Advancement of Women and Sport and Physical Activity.

Book Chapters (19)

Atkinson, M. (2016). Ethnography. In B. Smith, and A. Sparkes (Eds.). *International Handbook of Qualitative Methods in Sport and Exercise*. New York, NY: Routledge, 49-61.

Atkinson, M., & Gibson, K. (2016). Power and Power Relations. In D. Andrews, M. Silk, and H. Thorpe (Eds.). *Routledge Handbook of Physical Cultural Studies*. London: Routledge.

Nothen, G., & Atkinson, M. (2016). In Defense of Non/Humans: Mystification and Oppression in the Sports Mascoting Process. In A. E., George, and J. L., Schatz (Eds.). *Screening the NonHuman: Representations of Animal Others in the Media*. Lanham, Boulder, New York, London: Lexington Books, 169-184.

Atkinson, M. (2017). Ethnoaesthesia: Ashtanga Yoga and the Sensuality of Sweat. In A. Sparkes (Ed.). *Seeking the Senses in Physical Culture: Sensuous Scholarship in Action*. New York, NY: Routledge, 63-81.

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Cairney, J., & King-Dowling, S. (2016). Developmental Coordination Disorder. In J. L. Matson (Ed.). *Co-morbid Conditions in Children with Autism Spectrum Disorder*. Switzerland: Springer, 303-323.

Darnell, S. C. (2016). Sport in the Community: An Overview and Assessment of 'Sport for Development and Peace'. In E. Sharpe, H. Mair, and F. Yuen (Eds.). *Community Development: Applications for Leisure, Sport and Tourism*. Urbana, IL: Venture Publishing Inc., 171-182.

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