

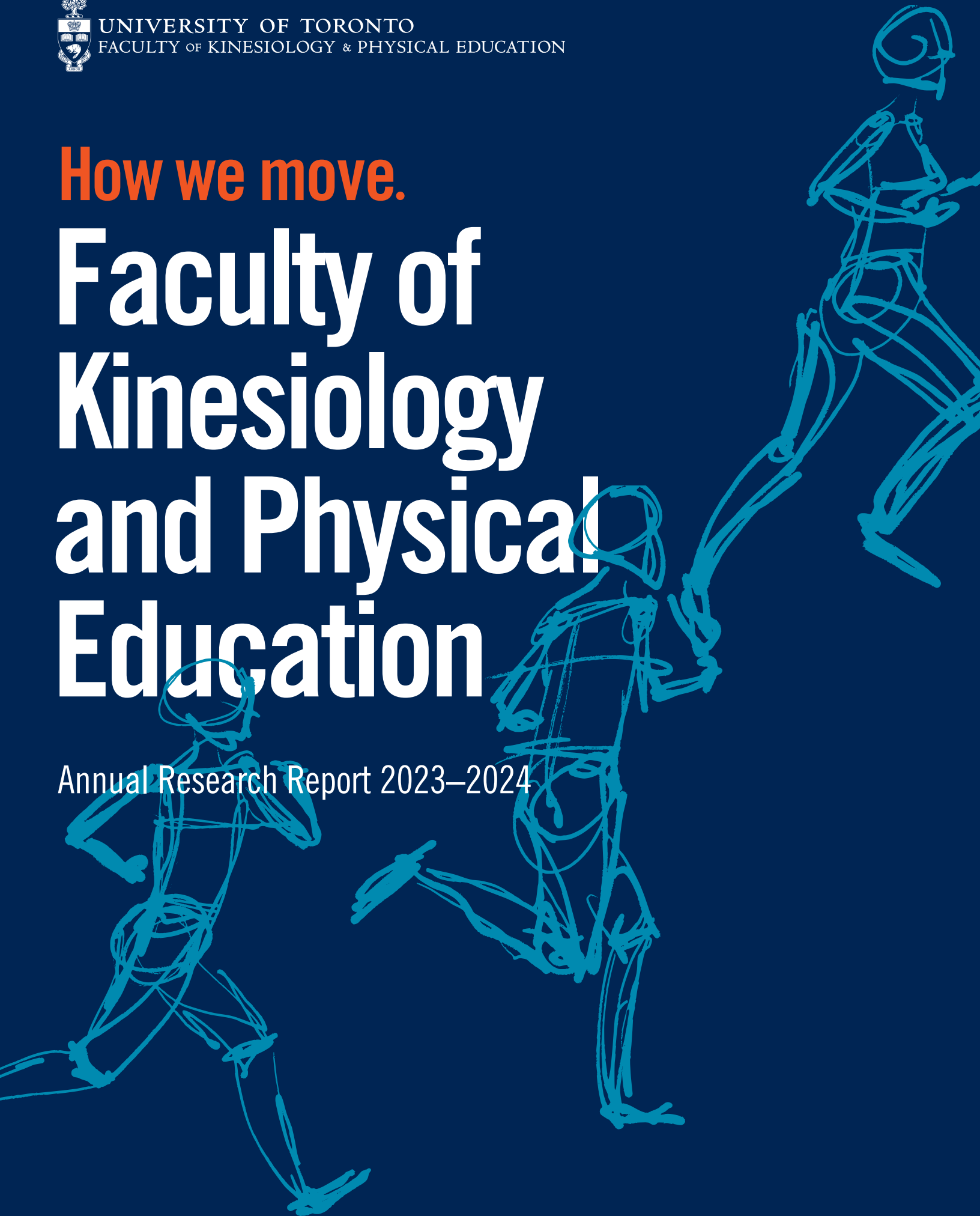


UNIVERSITY OF TORONTO
FACULTY OF KINESIOLOGY & PHYSICAL EDUCATION

How we move.

Faculty of Kinesiology and Physical Education

Annual Research Report 2023–2024



WELCOME



Gretchen Kerr, dean



Tim Welsh, associate dean of research

Welcome to the 2023-2024 Research Report of the Faculty of Kinesiology and Physical Education. We are pleased to share an overview of the great strides our researchers have been making towards achieving their research goals and the strategic priorities outlined in our Faculty's Academic Plan.

From exploring the impact of climate change on sport to investigating how much exercise is too much, our researchers continued to contribute important and timely insights of the benefits of an active lifestyle to the health of populations and the planet.

They collaborated with local and international partners on extensive research that is serving to develop and improve sport and physical activity programming in ways that better reflect the interests and needs of our diverse communities, here and abroad.

They led innovative research projects that bridge sport science and medicine, and made consequential new discoveries, including how exposure to mixed reality technologies can lead to temporary changes in how people perceive distances.

Their research also served as the basis for advocacy work aimed at protecting the health and safety of all athletes — from reducing incidences of concussions to removing gambling ads from sport arenas.

Underpinning this work have been the principles of equity, diversity, inclusion and belonging that are etched in the collective vision of our Faculty: to advance healthy living through inclusive movement.

These efforts have not gone unnoticed, with the reputable QS World University Rankings placing U of T programs in kinesiology, physical education and sport and exercise sciences in fifth place yet again.

Collectively, our faculty published 192 peer-reviewed articles, five books and 16 book chapters this year. They held over \$2.6 million in research funding across 48 research grants and contracts.

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

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How much exercise is too much?

Study looks into effect of exercising beyond recommended levels

(Photo by JohnnyGreig)

“**E**ndurance exercise training is generally considered good for the heart, as moderate to vigorous physical activity reduces all-cause mortality,” says Robert Bentley, an assistant professor at the University of Toronto Faculty of Kinesiology and Physical Education (KPE). “However, some evidence suggests that endurance exercise training completed beyond recommended levels may increase the risk of adverse cardiovascular outcomes.”

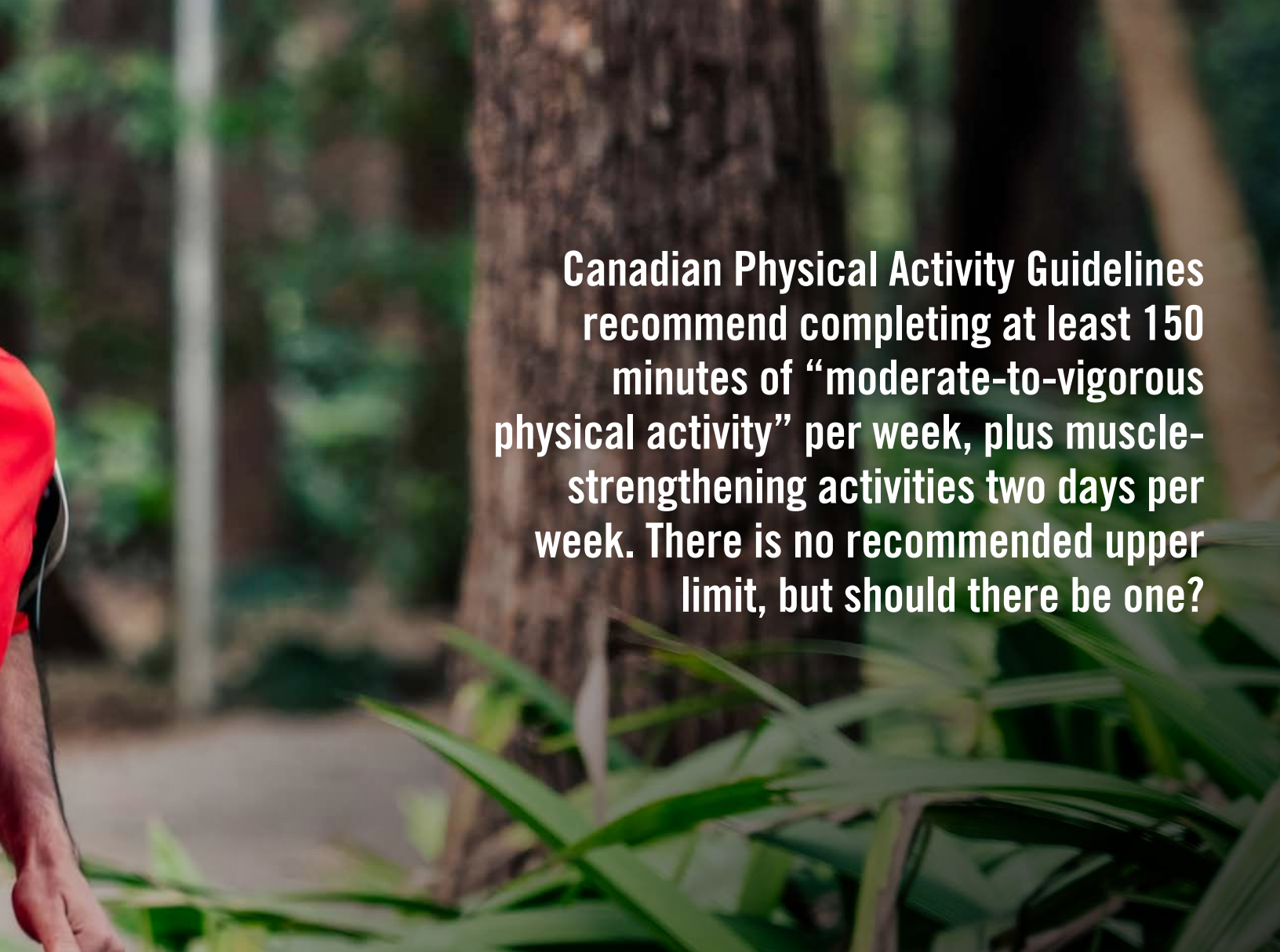
Bentley led a study exploring the effect of chronic exercise training and acute exercise on heart rate variability, recently published in the *Applied Physiology, Nutrition and Metabolism* journal.

Heart rate variability is a measure of the variation in time between each heartbeat. This variation is controlled by the autonomic nervous system (ANS), which automatically regulates our heart rate, blood pressure, breathing and digestion, among other key functions. The ANS can be subdivided into the sympathetic and the parasympathetic nervous systems, also known as the fight-or-flight or the rest-and-digest mechanisms.

The ANS sends signals to the hypothalamus in the brain, which then leads to either stimulation or relaxation of different bodily functions. When you are under constant stress, have poor sleep habits or even after you complete an exercise, this balance (the cardiac sympathovagal balance) may be disrupted, and your fight-or-flight response can shift into overdrive, which is linked to increased all-cause mortality.

“The purpose of our study was to contribute to the conversation surrounding potential detrimental cardiovascular effects of chronic endurance training by exploring heart rate variability throughout a 24-hour non-exercise period in middle-aged endurance athletes and recreationally active individuals,” says Bentley. “We also looked at how an acute, intensive exercise bout, reflective of a typical daily exercise perturbation, influenced these patterns in endurance athletes.”

119 endurance athletes between the ages of 49 and 57 and 32 recreational athletes between the ages of 52 and 60 wore a Holter monitor, which uses electrodes and a recording



Canadian Physical Activity Guidelines recommend completing at least 150 minutes of “moderate-to-vigorous physical activity” per week, plus muscle-strengthening activities two days per week. There is no recommended upper limit, but should there be one?

device to track the heart’s rhythm, over 24 hours during which they did not exercise. 51 endurance athletes then underwent 24-hour Holter monitoring following an intense bout of endurance exercise. Power spectral analysis of heart rate variability was completed hourly and averaged to quantify morning, evening, and nocturnal (night) heart rate variability.

Within power spectral analysis, low frequency bands represent a combination of sympathetic (fight-or-flight) and parasympathetic (rest-and-digest) activity, and high frequency bands represent parasympathetic activity. Endurance athletes were shown to have greater very low frequency and low frequency compared to recreational athletes. Endurance athletes also had a greater low frequency to high frequency ratio at night. Following acute exercise in endurance athletes, only nocturnal (night) heart rate variability was assessed, which showed that very low frequency and high frequency decreased, while the ratio of low frequency to high frequency increased.

“What these results suggest is that in endurance athletes, both long-term and acute exercise increase nocturnal sympathovagal (sympathetic and parasympathetic) activity, though this occurs through a disparate mechanism of an increase in low frequency or a decrease in high frequency bands, respectively,” says Bentley. “Interestingly, the power spectral analysis combined with time-domain analysis of heart rate variability, suggests that endurance athletes seem to have their foot on the gas (sympathetic activity) and brake (parasympathetic activity) at the same time.”

Whether or not that’s a good or bad thing, Bentley doesn’t know just yet.

“Further work is required to understand the mechanism underlying reduced nocturnal heart rate variability in middle-aged endurance athletes and the long-term health implications,” says Bentley.

By Jelena Damjanovic
Published online 20/11/2023

HOW CLIMATE CHANGE IS CHANGING SPORT:

Q and A with sport ecologist
Madeleine Orr



German triathlete Justus Nieschlag cools off at the Tokyo Games, where some athletes struggled to beat the heat (Photo by Getty Images)

Orr shares stories of athletes, teams and events that have been directly affected by climate hazards in her book called *Warming up: How climate change is changing sport*, which also explores the impact of sport on the planet and suggests actions the sport sector can take to adapt.

We sat down with Orr to discuss her book and research, and ask how she maintains her optimism in the climate fight.

In 2019, a world championship marathon in Doha was scheduled at midnight to avoid the blistering sun. That same year, athletes at the Rugby World Cup in Japan waded through knee-high water to reach the pitch after Typhoon Hagibis dropped 240 mm of water over Tokyo – the wettest storm on record in Japan.

From no snow winters to sweltering summer heat, sports are feeling the brunt of climate hazards and a slew of health, business and performance risks are going unaddressed, according to sport ecologist Madeleine Orr, an assistant professor at the University of Toronto Faculty of Kinesiology and Physical Education (KPE).

How does one become a sport ecologist? What drew you to this area of research?

There are many ways to become a sport ecologist; some enter through the sport sciences side – kinesiology, physiology, coaching – others begin in natural resource science, environmental studies, hydrology or climatology and then find their way to sport as the topic. My training combined a bit of both, and I feel fortunate to have had the opportunity to study across different faculties when I was in graduate school to learn how to read, interpret and develop climate models, and also how to measure the impacts of different climate hazards like extreme heat, humidity or wildfire on the athlete's health and performance, and the business side of sports.

So, how is climate change changing sport, directly and indirectly? Why is that important?

I spend about 200 pages of my book answering that question, but if I had to

split it into a few buckets, it would be that extreme heat is impacting athlete health and performance, and the well-being of everybody else around sport, including coaches, referees and fans; drought and floods are creating unstable and sometimes unhealthy playing surfaces in different parts of the world; wildfires are wreaking havoc on air pollution across huge swaths of land even far from the flames; and winters are getting shorter and less predictable due to climate change – so winter sports are suffering.

Climate change is important to think about in the context of sport because every single sport is dependent on clean air, clean water and a safe place to play, and when climate hazards crop up, they can lead to cancellations, delays, damages, health issues and in worst-case-scenarios – death for athletes.

Conversely, how is sport itself contributing negatively to the environment?

Sport – especially at the elite and

professional levels – is organized geographically and based on inter-regional and international travel. The business model of sport is based on tourism: the teams and events want people to come in from out of town, or to spend money at restaurants and other hospitality offerings near the venue. So, when lots of people – teams, referees, media, and fans – move around, it creates a pretty significant carbon footprint.

And in another sense, sport produces a lot of waste. Think of how many sports products are made from carbon fiber- just to name one example. It's in our hockey sticks, bikes, bats, boats, skis, racquets, nets, and the list goes on... It's a great product because it's strong and light, but it's also not recyclable, so once a piece of carbon fiber equipment gets even a tiny crack, it becomes unplayable, and in the case of bikes or boats, it has to be retired immediately for safety reasons.

Another example is sports gear: think of all the clothing and shoes that we buy to support our sport practices – most of it

is made from polyester because it wicks sweat. But it's also made from plastic and very hard to recycle, even if the product you buy says 'made from recycled materials'. Polyester can generally be recycled once, and then it starts becoming tricky to do it again as the quality of the material degenerates. All this to say, sport produces a lot of stuff that can't be recycled or reused, and that's a huge source of waste.

What can the sports world do to adapt? Specifically, how can sport organizations, managers, coaches, athletes and fans mitigate the risks associated with climate change and reduce their own environmental footprint?

That's a huge question, and I spent a lot of pages on this in the book. The first big thing is that we have to put safety first, and adopt policies and emergency protocols that keep athletes - and staff, coaches, fans, volunteers - safe when they're playing sport in unsafe conditions like extreme heat or wildfire smoke. The other piece will be to adapt our facilities and our schedules to avoid the worst of the climate hazards.

To reduce the footprint- the answer usually has to do with reducing travel, whether it's carpooling to practices with other kids on your team, or taking public transit to pro sport events when you go to watch. But there are lots of other things individuals and sport organizations can do on reuse and recycling that I discuss in the book as well.

What might prevent them from taking action?

There seems to be a perception that climate change is still polarizing and political, but it's really not. At least, not in Canada, and really not in the U.S. either. The Yale Centre for Climate Communications has done annual surveys on this and finds that the vast majority of Americans believe climate change is happening and agree we need to do more about it. So, we need to start getting past the hesitancy to speak up, and start talking about it more. One way to do that is to make the conversation personal - talk about the ways climate change is impacting you or your organization - and this book points out lots of those impacts - and then move into a conversation about how we keep ourselves and each other safe and healthy and playing sport into the future.

How do you respond to people who say to athlete activists to 'stay in their lane'?

There are always going to be trolls and haters. I say ignore them. George Monbiot, an environment reporter for The Guardian, once said "we are hypocrites. Every one of us, almost by definition. Hypocrisy is the gap between your aspirations and your actions. And I'll take hypocrisy any day" and that resonates with me. I try to remind athletes or other activists that nobody would pass a purity test on climate action - we've all got a carbon footprint, we all have agency to make some choices that are more sustainable but not ALL choices - because some are expensive, and some are just out of our control. So, let yourself off the hook of 'being perfect', continue to communicate your concerns to the world, and ignore the trolls.

As an academic and an advocate, what have you found to be the most effective method of raising awareness and gaining broad support for your cause?

Talking about sports. Really, most people have some connection to sport - whether as a fan, or an athlete, or perhaps they have a kid that plays soccer on the weekends. When you talk about climate change and make it about life-or-death stakes for people on the other side of the world, that can be hard for people to relate to. It's also hard for people to relate to polar bears, or bugs going extinct. But sport is relatable. So, most of my advocacy is about keeping sport and play safe and accessible into the future. Most people have no problem getting on board with that.

Who are your personal heroes in this realm?

Oh, so many! I'm a fan of all the people who are 'sport insiders' who work in sport organizations and are having hard conversations with their bosses every day about how sport can do better. I'm also in awe of athletes who lend their platforms to this issue, because I know many get push-back for it. And then in the academic space - Professor Michael Mann at Penn State is on the board of EcoAthletes with me and every time he speaks about this, he's clear and concise and conveys urgency, without freaking people out, and I think that's the kind of tone I'm trying to match in my own advocacy.

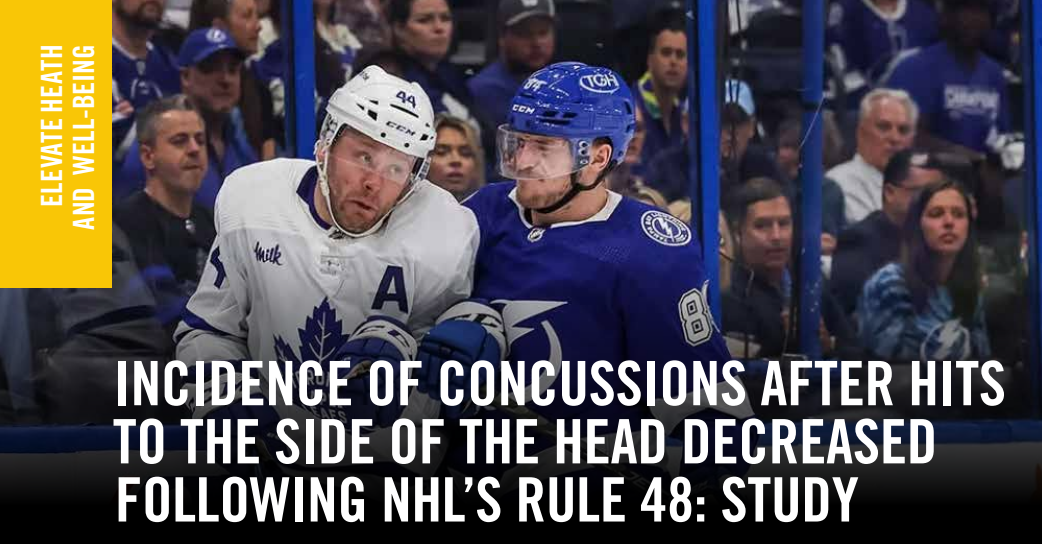
Is there a particular story of an athlete, team or event that you share in the book that stuck with you more than any other because it really drives the message home?

I share stories of parents who've lost their sons to heat stroke. I share stories of Fijian rugby players who are losing their playing grounds to sea level rise. I share stories of winter athletes suffering more injuries - including concussions - due to poor surface conditions and how that is leading to mental health crises in the winter sports world... so it's hard to pick just one. There's no shortage of moving stories. And there were so many more that I got in the course of my research that I wasn't able to share because it would've made the book 400 pages longer if I did. Maybe those will come in the next book.

Finally, how do you maintain your optimism that the world, with help from the sport sector, can reverse the course of climate change?

I don't think we can afford not to change. We just have to. And I'm under no illusion that sport - especially pro and elite sport - is going to be the first mover on this, but this sector does have a huge platform and potential to inspire not only fans who follow, but all of its supply chains. When sport has used that platform in the past, it's ignited major public conversations about issues like gender equity - think of Billie Jean King, or the more recent work of women's soccer teams - and racial injustice - think the 2020 Black Lives Matter boycotts and before that Colin Kaepernick and before that, Kareem Abdul-Jabbar. Sport has a rich history of drawing attention to big debates and discussions. And I think we can do that again with climate change.

**By Jelena Damjanovic
Published online 19/04/2024**



INCIDENCE OF CONCUSSIONS AFTER HITS TO THE SIDE OF THE HEAD DECREASED FOLLOWING NHL'S RULE 48: STUDY

(Photo by Getty Images)

The incidence and proportion of concussions suffered by NHL players following hits to the lateral side of the head reduced substantially following the implementation of the league's Rule 48, according to a study led by Michael Hutchison, an associate professor in the University of Toronto's Faculty of Kinesiology and Physical Education (KPE).

The study, published on *JAMA Network Open*, compared the incidence and mechanisms of concussions that occurred following hits to the head before and after the implementation of Rule 48, which was introduced in the NHL's 2010-11 season to prohibit direct hits to the lateral side of the head, and was widened the following season to prohibit direct contact to all areas of the head.

In all, 688 concussions were analyzed: 231 for NHL regular seasons from 2006 to 2010 (before the rule was introduced) and 457 for the 2014 to 2019 seasons.

"We hypothesized that after the implementation of Rule 48, we would observe a change of behaviour whereby there would be fewer concussions resulting from hits to the head," said Hutchison, who is director of the concussion program at KPE's David L. MacIntosh Sports Clinic.

"Our findings show a significant decline in concussions post-Rule 48 implementation, specifically a decrease of 18.8 percentage points in the proportion of concussions due to hits to the lateral aspect of the head, which dropped from 34.6 per cent (80 out of 231 concussions) before Rule 48 to 13.3 per cent (61 out of 457) afterward."

While these results indicate a positive behavioural change in the sport, Hutchison's study observed an overall increase in the incidence of concussion between the two time frames – although incidence of concussion due to hits to the lateral aspect of the head decreased from 1.6 per 100 games to 1.0 per 100 games.

"Rule 48 appears to be effective for its intended purpose – eliminating behaviours that accounted for the majority of concussions in the NHL."

Hutchison says the overall increase in concussion incidence between the two time frames ran contrary to the team's hypothesis, but noted that there were numerous factors at play that could contribute to an increase in reports of concussions. "Importantly, the period following the introduction of Rule 48 coincided with enhanced efforts regarding concussion awareness and identification of suspected concussions, including the addition of a spotter program whereby certified athletic trainers watch games centrally in an off-site location to identify visible signs of possible concussions, while in-arena spotters watch games live to identify visible signs, including those not captured by video," he said.

Assessment tools and approaches used to diagnose a suspected concussion have also improved over time, says Hutchison,

and education campaigns about the health risks associated with concussion and the importance of early detection have ramped up, too.

"These targeted initiatives may have resulted in greater awareness and reporting of concussion, thereby likely contributing to the increase in concussion incidence between the two periods," says Hutchison.

"The identification and prevention of concussion is multifaceted, but of importance. Rule 48 appears to be effective for its intended purpose – eliminating behaviours that accounted for the majority of concussions in the NHL."

Hutchison says it's important to keep exploring ways to prevent concussions and protect player safety. For example, he noted that in recent years, it appears that most concussions occur around the perimeter of the rink – specifically the side boards and corners.

"Given the inherent nature of collision – both intentional body checks and incidental collisions – future research should involve a close examination of the behaviours and mechanisms of concussions following player-to-player contact around the perimeter of the arena, such as the types of surfaces and environments, and specific locations of head contact," says Hutchison.

"This study provides important insight regarding patterns of concussions and the potential influence of policies targeting health and safety."

On November 22, 2023, a KPE panel of experts, including Hutchison, Associate Professor Doug Richards and PhD candidate Kyla Pyndiura came together to discuss the latest advancements in concussion research, as part of KPE's Science Café series.

The panelists dove deep into the latest trends and insights, evaluated the effectiveness of current efforts to reduce the burden of concussion, and explored proactive sports measures to minimize concussion risks.

**By Jelena Damjanovic
Published online 21/11/2023**

IS IT SAFE TO EXERCISE WHEN THE AIR IS SMOKY?

Q & A with exercise physiologist Ira Jacobs

We chatted with Ira Jacobs, a professor at the University of Toronto Faculty of Kinesiology and Physical Education, and director of the Tanenbaum Institute for Science in Sport, about how everyday fitness and exercise routines can be modified to suit such conditions. Jacobs' area of expertise includes physiological responses and adaptations to environmental extremes.

Smoke from forest fires out west and 48 active fires in Northern Ontario contribute to a hazy view of the skyline from Humber Bay Park West (Photo by Getty Images)

Should we exercise outside when the air is smoky from wildfires? What are the risks?

The short answer is “no”. The main issues of concern are the absolute amount and size of the particles in the air that are associated with both acute respiratory health risks, as well as accumulating increases in those risks with repeated exposures.

The other important aspect is our body's ventilation rate — how much air is being drawn into our lungs. When it comes to the effects of the forest fires on our outdoor air quality during the last few days ... the news is actually fairly bad. Reports indicate that over 90 per cent of the air particulate content of forest fire smoke consists of very fine (small) particles that are about less than 2.5 microns in size (about 40-50 times smaller than a grain of sand). The smaller the particulate size, the deeper down into our lungs that those particles can be drawn and deposited. And, the deeper they go, the greater the pulmonary/respiratory health risks.

The health risks are compounded

because most of us become primarily “mouth breathers” when we exercise, so some of the body's natural particulate trapping and filtering mechanisms in the nasal cavity become ineffective at the high ventilation rates that we generate during exercise — at least 10 times the normal resting ventilation rates, and much higher for athletes who are training or competing.

What's a good alternative?

Much of the problem is avoided or significantly reduced by exercising indoors, particularly in more recently constructed buildings that are well sealed and where the indoor air is recirculated and cooled as part of the recirculation process. Some older large buildings draw in outdoor air continuously and cool it after it has been drawn into the building, so it's good to know what the status of the air circulation is wherever you're exercising indoors given today's air quality challenges. Even in this worst-case scenario (for exercising), appropriate filters can be installed to trap the <2.5-micron particulate matter of concern. In summary, for now and until the air quality index improves, exercise in

a central air-conditioned building or home.

For those not easily dissuaded, are there any adjustments they can make to reduce the risks such as shortening the length of the exercise, doing it slower or wearing a mask?

Yes, reducing the duration of exercise at high ventilation rates will commensurately reduce the risk.

And, yes, wearing a respirator like a N95 respirator that traps particulate matter that is less than 2.5 microns in size is also effective, but admittedly not very pleasant on a warm day. And some people find that a respirator or any face mask seriously impedes the ability to maintain the kind of exercise intensities that high performance athletes need to maintain their training effects.

So, is it just better to go to the gym while the air quality advisory is in effect?

Definitely.

By Jelena Damjanovic
Published online 19/04/2024



New project to raise awareness about equity, diversity and inclusion in health research

A new project is bringing together Black, Indigenous and people of colour researchers in kinesiology to raise more awareness about issues of equity, diversity, Indigeneity, inclusion and accessibility (EDIIA) in health research.

Tricia McGuire-Adams is an associate professor at the University of Toronto Faculty of Kinesiology and Physical Education
(Photo by Tricia McGuire-Adams)

The project, called Navigating EDIIA in physical activity and health research: Defining terminology and approaches, was spearheaded by Eun-Young Lee of Queen’s University and funded by the Canadian Institute for Health Research (CIHR) Planning and Dissemination Grant.

It involves a mix of early and mid-career researchers in the discipline of kinesiology from across Canada, including **Tricia McGuire-Adams**, an associate professor at the University of Toronto Faculty of Kinesiology and Physical Education (KPE). McGuire-Adams, who is an Anishinaabe woman from Bingwi Neyaashi Anishinaabek, will bring an Indigenous health perspective in understanding EDIIA. She spoke with us about the new project.

What are the specific objectives of this project?

Our immediate objectives are twofold. In 2017 and 2022, CIHR implemented sex-and-gender-based analysis (SGBA) and gender-based analysis (GBA+) as required areas of focus for funded research projects. So, our first order of business will be to complete a systematic scoping review focusing

on the ways in which social-identity terms such as sex and gender, race and ethnicity, sexual orientation, etc., have been defined, operationalized and/or used in physical activity and health research since these policies were introduced.

Second, we will bring together our research team who represent BIPOC identities to have a series of discussions and work together to identify priorities and recommendations for improving EDIIA in health research.

Why is this work important?

CIHR has concertedly focused on equity, diversity and inclusion by encouraging researchers to incorporate these tenets into their research plans. While this focus is needed to better situate the ways equity, diversity and inclusion are part of research, guidance that translates into research is lacking. Terms like sex and gender are constantly being conflated or misused, which leads to the interpretations of the results being missed or not useful in addressing sexism or gender inequalities.

Moreover, key intersectionality factors like race and ethnicity are also misused or conflated. For example, simply observing and reporting racial or

ethnic differences in participation offer little in making the changes we need to get more people to be physically active for optimal health.

Physical activity and health researchers must move beyond just measuring simple sex/gender, race/ethnicity and other identity-based variables. We must also ensure that we are paying concerted attention to the root causes of inequity in physical activity such as sexism, racism, homo/transphobia, ableism and discrimination on grounds of sexual orientation, gender identity, social class and minority language and immigrant status.

How will researchers benefit from this project?

The outcome of our planning meeting will include providing concrete and specific recommendations with examples on how researchers from varying fields can integrate sex and gender in their research process in a meaningful way. And the results of the scoping review will illuminate how the field currently incorporates intersectionality.

By Jelena Damjanovic
Published online 26/09/2023



KPE study explores why VR and AR technologies change how people interact with objects

Research associate Xiaoye Michael Wang fits a virtual reality (VR) head-mounted display onto a study participant, KPE undergraduate student Colin Dolynski (Photo by Molly Brillinger)

A new study from the University of Toronto Faculty of Kinesiology and Physical Education (KPE) looked into the potential impact that virtual (VR) and augmented reality (AR) technologies have on people interacting with virtual objects. The researchers wanted to understand if there are differences between moving in real and virtual environments so that they can better design virtual environments to enhance performance and learning transfer between real and virtual worlds.

“While virtual (VR) and augmented reality (AR) are often associated with gaming, these technologies are increasingly used in training for tasks that require hand-eye coordination through fine motor skills such as performing surgical procedures or pilot training,” says Xiaoye Michael Wang, a research associate at KPE and lead author of the study, recently published in Springer’s *Virtual Reality* journal.

“In this context, it is important to ascertain that the skills practiced during training in the virtual world are comparable to the skills that are relied on in practice in the physical environment because otherwise, one is actually not training for the skills as intended.”

The study confirmed what scientists and engineers have long known, which is that people move differently in real and virtual worlds. Specifically, people tend to undershoot (move shorter than they should) when interacting with objects in VR and AR. The innovation of the new study is that it identified one of the key mechanisms that contributes to this undershooting.

“VR and AR convey an immersive

3D environment via screens that are placed right in front of the users’ eyes,” says Wang, who works with Professor Timothy Welsh in KPE’s Action and Attention research lab. “This technological arrangement alters the natural visual geometry in perceiving depth, which, in turn, creates depth compression where objects appear to be closer to the user than they actually are.

“This depth compression contributes to the undershooting errors in movement.”

Based on their understanding of how the eyes move and change during the perception of different distances, the researchers identified the underlying geometry that alters visual stimuli in VR and AR that leads to the distance compression. They then looked into how they can develop a software solution that could alleviate the depth compression and make perception and movements more accurate in VR and AR.

The difference in the ways the eyes work in real and virtual environments and how these differences lead to distance compression is known as the vergence-accommodation conflict. This conflict has been a key technical

challenge of VR since its conception in the 1990s. Many companies have spent millions, if not billions, of dollars trying to solve this issue using hardware solutions such as developing a complex set of lenses that could change where the screens are perceived, or even creating a lens from a type of permeable material that could change the lens’ shape to be more like the human eyes.

“However, all of these hardware changes require intensive research and development with contributions from different teams such as optical and mechanical engineering, human factors and even machine learning,” says Wang. “Our study shows this issue could be resolved using a simpler computer program without relying on complex and expensive hardware.

“The program systematically modifies how far away things are presented in the virtual world to offset the effect of the distance compression as a result of the vergence-accommodation conflict.

“This innovation could be a really exciting and cost effective for the VR/AR industry.”

The researchers are currently validating the algorithm proposed in the study to evaluate its effectiveness in eliminating depth compression in VR. For their work, the team was also selected for U of T’s UTEST program to explore commercialization potentials.

To this end, the team is also interested in working with surgeons, medical professionals and other VR companies in developing scenarios in which they could test the effectiveness of their algorithm in practice, i.e. in surgical training.

“With limited opportunities available for traditional, in-person training methods, using VR as an alternative for surgical training could greatly alleviate the need for access to physical resources,” says Wang, “but these benefits can only be achieved if the technology accurately represents how the trainee perceives and moves in the real world.”

By Jelena Damjanovic
Published online 10/04/2024

TISS Research Accelerator Grants support research projects bridging sport science and sport medicine

The Tanenbaum Institute for Science in Sport (TISS) has awarded seven teams of researchers affiliated with the institute with TISS Research Accelerator Grants. The grants, which support new ideas and promote innovation and interdisciplinary research in sport science and sport medicine, will provide each team with \$120,000 for their research project to be completed over two years.



(Photo by Ira Jacobs)



Associate Professor Kelly Arbour Nicitopoulos is the principal investigator of one of the seven research projects funded by the TISS Research Accelerator Grants (Photo by Dewey Chang)

“I’m very gratified that our first cycle of TISS Accelerator Grants attracted the attention of excellent groups of sport medicine and sport sciences researchers,” said TISS director Ira Jacobs, a professor at KPE. “I will be equally excited to learn about the new knowledge and innovation their work generates over the next couple of years.”

These are the awarded research projects.

ATHLETE CONCUSSION SURVEILLANCE IN SPECIAL OLYMPICS SPORTS

“Athletes with intellectual disability (ID) have been severely underrepresented in concussion research, education and care,” says principal investigator Kelly Arbour-Nicitopoulos, an associate professor in the Faculty of Kinesiology and Physical Education (KPE) at the University of Toronto with expertise in adapted (disability) physical activity and psychology. “This project brings together leaders in the Special Olympics (SO) Canada community and concussion and disability research to co-create a feasible solution to the current lack of standardized assessment and surveillance of concussion in SO sports.”

The study objectives are:

- To develop and pilot a SO athlete concussion surveillance tool that can enable coaches and medical staff to capture concussion injury, demographic and sport characteristics, and

- To surveil Canadian SO competitive athlete concussion incidence and history.

Phase One will use the nominal group technique, a structured method for group brainstorming that encourages contributions from everyone, to gather feedback and consensus from five medical staff and five coaches on the items to be included within a prototype SO concussion surveillance tool. The PRIVIT injury tracking tool will serve as the technology and the collected concussion information will be adapted based on the group’s consensus.

Phase Two will use prospective and retrospective approaches to pilot the implementation of the surveillance concussion tool at four large multi-day SO competitions. These Games will include 2300+ SO athletes across a range of SO sports. Onsite survey data collection will occur with 360 caregivers to capture retrospective concussion history while focus groups with a subgroup of 16 medical staff and 16 coaches will be conducted to gain an understanding of their experiences with using the surveillance tool.

Phase Three will support knowledge translation and dissemination activities to enhance the uptake of the study findings among the SO and sport science community.

The co-principal investigator of the research project is Nick Reed, an associate professor at the Temerty Faculty of Medicine in the department of occupational science and occupational therapy, with Emily Bremer, an assistant professor in the School of Kinesiology at Acadia University and Canada Research Chair

in Healthy Inclusive Communities, and Michael Hutchison, associate professor at KPE with expertise in sport concussion and rehabilitation, as co-investigators.

They will also collaborate with Tom Davies and Kendra Isaac from Special Olympics Canada, and the Centre for Sport-Related Concussion Research, Innovation and Knowledge on this project.



(Photo by iStock)

GYMNAST WRIST INJURY PREVENTION PROGRAM (G-WIPP)

Nearly 88 per cent of gymnasts experience wrist pain during their careers, with particularly high forces applied during floor, pommel and vault events. Furthermore, 10 per cent of adolescent gymnasts experience an injury to the growth plates of the radius and/or ulna, the two bones in the forearm - this is called the Gymnast Wrist (GW).

Contributors to GW include early age of sports specialization, high volume of repetitive training and peak levels of training that often correspond with the adolescent growth spurt. Growth arrest from repetitive loading causes painful deformity and/or unstable wrists that can necessitate lengthy time off sport, surgical correction (in three per cent of athletes), or even early retirement.

“While these risks are well established, definitions of safe wrist loading intensity and volume remain vague for these young athletes,” says principal investigator Andrea Chan, an assistant professor in the U of T divisions of orthopaedic and plastic surgery, and pediatric/adult hand & wrist surgeon at Toronto Western Hospital and Hospital for Sick Children. “There are no evidence-based objective guidelines to help

athletes, coaches and their medical team navigate acceptable levels of training during peak growth velocity nor how to guide treatment and rehabilitation scientifically.”

The ultimate goal of the Gymnast Wrist Injury Prevention Program (G-WIPP) is to develop high-level evidence-based recommendations to inform the best clinical practice for safe levels of wrist loading, including volume, intensity and load, during peak growth velocity.

The research team will produce a position statement on Gymnast Wrist, which will outline key risk factors and predictors for wrist injury; operationalize an effective evidence-based Gymnast Wrist risk reduction program, which will include educational tools, a novel athlete-accessible biometrics app for tracking growth, and specific bracing recommendations; and lastly, inspire engagement in healthy and safe gymnastics participation.

Chan will be collaborating on this project with Ryan Paul, assistant professor in the U of T divisions of orthopaedic and plastic surgery, and adult and sports hand and upper extremity surgeon at Toronto Western Hospital, Timothy Burkhart, an assistant professor at KPE specializing in orthopaedic biomechanics, and John Theodoropoulos, an assistant professor of orthopaedics at U of T, Doviği orthopaedic sports medicine chair at Mount Sinai Hospital and orthopaedic surgeon at Women’s College Hospital.

SLEEP APNEA IN PARALYMPIC ONTARIO-RESIDENT ATHLETES WITH SPINAL CORD INJURY (SPORTS) STUDY

Spinal cord injury (SCI) can be a catastrophic event for individuals who may sustain motor, sensory and autonomic deficit, which occurs when the autonomic nervous system, which controls functions responsible for well-being and maintaining balance, does not regulate properly.

SCI often causes multiple secondary health conditions, including sleep apnea that is found in up to 50 per cent of the individuals with paraplegia, a symptom of paralysis that mainly affects your legs, and up to 91 per cent of the individuals with tetraplegia, a paralysis caused by an injury of the cervical spinal cord.

“Although the frequency of sleep apnea after SCI is much higher than in non-disabled people, this condition is still largely understudied, underrecognized and under-treated in the SCI population,” says principal investigator Julio C. Furlan, an associate professor at the Temerty Faculty of Medicine, staff neurologist and clinician investigator at Lyndhurst Centre, Toronto Rehabilitation Institute, University Health Network, and scientist at KITE Research Institute.

In the general population, untreated sleep apnea has been linked with an increased risk of stroke, heart attack, heart rhythm problems, diabetes and kidney disease. Untreated sleep apnea has also been associated with several

psychosocial, neurocognitive and behavioral consequences affecting individuals' quality of life, well-being and performance in recreational and professional sports.

“We hypothesize that continuous positive airway pressure (CPAP) for treatment of moderate-to-severe sleep apnea in high-performance athletes with SCI will alleviate fatigue, depressive symptoms, anxiety and cognitive impairment, thereby improving their work and social participation, and quality of life, as well as improve their performance and perceived risk of injuries,” says Furlan.

This two-year novel research project will include a single-arm clinical trial to evaluate the efficacy of CPAP in the management of moderate-to-severe sleep apnea among high performance athletes with SCI who have moderate-to-severe sleep apnea; and a qualitative analysis that will entail face-to-face interviews to identify the perspectives of athletes with SCI who undergo CPAP therapy, and their perceptions about the risk of sports related injuries.

Working with Furlan on this research project are Mark I. Boulos, an associate professor at the Temerty Faculty of Medicine, staff neurologist and associate scientist with subspecialty in sleep and stroke neurology at Sunnybrook Health Sciences Centre, Kimberly Coros, an assistant professor of physical medicine and rehabilitation in the department of medicine at the Temerty Faculty of Medicine, staff physiatrist at Bridgepoint Active Healthcare – Sinai Health Systems, sports medicine physician at the Canadian Sport Institute Ontario, and member of the board of directors of the Canadian Academy of Sport and Exercise Medicine, Sivakumar Gulasingam, an assistant professor at the Temerty Faculty of Medicine, with expertise in spinal cord medicine and sports medicine, staff physiatrist at Lyndhurst Centre, Toronto Rehabilitation Institute, University Health Network, and chief international classifier of para athletics for the World Para Athletics (WPA) and International Paralympic Committee (IPC), Martha McKay, a staff psychologist and clinical neuropsychologist in the spinal cord program at Lyndhurst Centre, Toronto Rehabilitation Institute, University Health Network, with expertise on mental health in individuals with disability including spinal cord injury, Sandra Walsh, a staff registered respiratory therapist and certified respiratory educator in the spinal cord program at Lyndhurst Centre, Toronto Rehabilitation Institute, University Health Network, with expertise on respiratory dysfunctions and sleep-related breathing disorders in individuals with spinal cord injury, Joel Greenshields, manager of research, data and technology solutions at the Canadian Sport Institute Ontario, specializing in exercise physiology, statistics and sports performance applications, Melissa Lacroix, a sport scientist and current Integrated Support Team (IST) lead, physiologist with Wheelchair Rugby Canada and senior manager for high performance with Tennis Canada, and Amie Bouley, a registered nurse who developed paraplegia after a spinal cord infarct, followed by secondary medical conditions including sleep apnea.

RECOMBINANT HUMAN GROWTH HORMONE (RHGH) FOR EARLY PATELLOFEMORAL OSTEOARTHRITIS: A PILOT, RANDOMIZED PLACEBO-CONTROLLED TRIAL

Patellofemoral arthritis, a common cause of anterior knee pain, affects 3.9 million Canadians. Treatments range from weight loss to total knee arthroplasty, a surgical procedure to restore the function of the joint.

“The treatment option for young adults with mild to moderate arthritis mostly reduces symptoms, rather than reverses the disease process,” says principal investigator Ajay Shah from the division of orthopaedic surgery in the department of surgery at the Temerty Faculty of Medicine. “Identifying a treatment regimen that improves biomechanics and strength can empower patients to have high self-efficacy when facing previously untreatable disease.”

The research team will conduct a pilot blinded randomized trial, the gold standard for safety and efficacy in establishing a novel treatment. Patients will be randomly assigned to treatment arms and receive either high growth hormone (HGH) or placebo alongside therapy for six weeks. At up to 12 months, the team will test for muscle strength, administer surveys and analyze imaging.

This study protocol is similar to previously published trials studying HGH in other populations. HGH has recently been shown to help with recovery after acute injuries, but this is the first study to apply it to arthritis treatment.

The researchers expect a primary outcome to be increases in patients' thigh and hip muscle strength, measured using a computerized machine. The primary question will be whether six weeks of HGH improves knee extension (quadriceps) strength compared to placebo at six months in patients with patellofemoral arthritis participating in a physical therapy program. The team will also survey patients' symptom severity and quality of life, and assess arthritis progression and gait changes, which are all abnormal in patellofemoral arthritis.

“This small trial will first establish if HGH is safe to use, and the next steps would be a large trial that enrolls patients from multiple hospitals,” says Shah. “Eventually, HGH and similar medications could be common treatments for osteoarthritis. Future studies could also continue to explore the ability of HGH to regrow cartilage.”

Co-investigators of this research project include Bheeshma Ravi, Sebastian Tomescu and David Wasserstein affiliated with the division of orthopaedic surgery, in the department of surgery at the Temerty Faculty of Medicine and Sunnybrook Health Science Centre, and the Sunnybrook Research Institute, Timothy Burkhart, an assistant professor of orthopaedic biomechanics from KPE, Michael Catapano from the division of physical medicine and rehabilitation in the department of medicine, at the Temerty Faculty of Medicine, Sunnybrook Health Sciences Centre, Sinai Health System, and the Sunnybrook Research Institute, Cari Whyne from

the Sunnybrook Research Institute and David Lawrence from the Dovi Orthopaedic Sports Medicine Clinic in the Sinai Health System.

BUILDING CAPACITY FOR THE DELIVERY OF MENTAL HEALTH CARE AMONG ELITE YOUTH ATHLETES: A YOUTH AND FAMILY ENGAGED APPROACH

Elite youth athletes train and perform in highly competitive, specialized sport environments during youth and adolescence, facing similar demands as adult athletes despite being developmentally different from adult athletes. Additionally, research shows that in Canada, young people are more likely to experience mental disorders than any other age group, and the peak age of onset of mental disorders occur during the mid-teen years

“Given that early detection and intervention is key to addressing mental health concerns in young people and for optimizing elite athletes’ well-being and mental health, it is critical to improve our understanding of elite youth athletes’ experiences of mental health,” says principal investigator Katherine Tamminen, an associate professor at KPE and registered psychotherapist with expertise in sport psychology, mental health in sport/elite athletes, youth sport & parental influence among adolescent athletes. “Additionally, parents’ involvement in help-seeking for their elite youth athletes’ mental health concerns has received little research attention to date.”

This project will adopt a youth- and family-engaged approach to develop and implement research that is co-designed with elite youth athletes and parents to:

- build capacity for research activities
- identify priority research areas
- develop a research plan with youth and families, and
- conduct an initial examination of key concerns and problems in seeking help for mental health among elite youth athletes and their parents.

The research will be the first of its kind to examine the issue of mental health among elite youth athletes and will serve as a model to develop effective approaches to support elite youth athletes and their parents in seeking support for mental health concerns.

Tamminen’s co-investigators include Courtney Walton, an academic fellow in the Melbourne School of Psychological Sciences at the University of Melbourne and registered psychologist trained in sport and exercise psychology, Jo Henderson, a professor in the department of psychiatry at the Temerty Faculty of Medicine and director of the Margaret and Wallace McCain Centre for Child, Youth and Family Mental Health at the Centre for Addiction and Mental Health, Jordan Sutcliffe, a postdoctoral fellow at KPE with expertise



(Photo by iStock)

in sport psychology, family dynamics in sport, mental health and wellbeing in sport and group dynamics, Rosemary Purcell, a professorial fellow in the Centre for Youth Mental Health (CYMH) at the University of Melbourne, director of knowledge translation at Orygen, Australia’s National Centre of Excellence in Youth Mental Health, registered psychologist and member of the International Olympic Committee’s mental health working group.

EVALUATING NEUROINFLAMMATION IN ATHLETES WITH CONCUSSION

Concussion is a common and debilitating form of traumatic brain injury (TBI) affecting millions worldwide. Although its acute symptoms often resolve within a few weeks, 10 to 20 per cent experience long-lasting symptoms such as headache, anxiety, depression and problems with concentration and memory. The long-term health-related effects of multiple concussions have become a growing concern as concussions have been associated with dementia, Parkinson’s disease, attention deficit disorder, mood impairments and chronic traumatic encephalopathy (CTE) in former contact sports athletes.

“There is increasing evidence that inflammatory changes can occur in all traumatic brain injury including mild (mTBI) and concussion,” says Carmela Tartaglia, an associate professor in the Tanz Centre for Research in Neurodegenerative Diseases at the Temerty Faculty of Medicine, and cognitive neurologist and investigator in the Canadian Concussion Centre of the Krembil Brain Institute at the University Health Network. “A better understanding

of the role of neuroinflammation in concussion could help prognosticate on outcome and reveal new avenues of treatment.”

The researchers aim to overcome the challenge of variability in the results of existing studies of inflammatory mechanisms in concussion by evaluating a large number of inflammatory markers in athletes with concussion in the acute phase. The overarching aim is to better understand the role of neuroinflammation in concussion and persisting symptoms of concussion patients.

“We hypothesize that inflammatory abnormalities can be detected in mTBI and allow differentiation from musculoskeletal controls,” says Tartaglia. “To test our hypotheses, we will use novel technology to quantify 737 inflammatory proteins in plasma, to compare inflammatory profiles between patients with concussion and musculoskeletal controls, as well as assess their prognostication capability and relationship to neurodegeneration markers.”

Michael Hutchison, associate professor at KPE and director of sport-related concussion research, innovation and knowledge, and Charles Tator, neurosurgeon in the University Health Network, clinician scientist in the Krembil Brain Institute, and director of the Canadian Concussion Centre at Toronto Western Hospital, are co-investigators on this research project.

THE CHRONIC ACL DEFICIENT “CAD” KNEE: ESTABLISHING A MULTIDISCIPLINARY COLLABORATIVE TO KEEP THESE ATHLETES IN THE GAME

An athlete with a chronic ACL deficient (CAD) knee has failed previous ACL reconstruction (ACLR) or presented with the condition more than six months after injury due to treatment/diagnosis delay or failure of non-operative management.

“A CAD knee has additional cartilage injury and changes to bone and other ligaments, which are not seen in recent ACL injury leading to poorer outcomes with the classic paradigm of performing ACLR,” says principal investigator of this research project Timothy Burkhart. “There is a need for novel treatment approaches.”

The TISS accelerator funding will be used to:

- Create a university-wide shared CAD knee registry containing baseline patient information including physical examination, patient reported outcomes and imaging with the goal of providing pilot data for future clinical studies
- Develop a cadaveric model of the CAD knee.

The researchers will take 10 knee specimens and section the ACL. They will then use a material testing and pressure



(Photo by iStock)

inducing machine to simulate playing sports on an ACL deficient knee in order to induce the secondary anatomic changes characteristic of the CAD knee.

“Having a model to study the CAD knee will open doors to examine alternative treatment options to the classic paradigm of ACLR,” says Burkhart. “Currently, there is no such model in existence, but once a validated model is achieved with TISS accelerator funding, we will be able to pursue peer-reviewed funding from external granting agencies to examine novel treatment approaches.”

The funding will also facilitate the career development of a U of T collegiate track athlete (Kosaran Gumarathas), who has been accepted to the Institute of Medical Science MSC program to complete the above study.

Burkhart will be collaborating on this research project with Sebastian Tomescu and Jaskarndip Chahal, from the division of orthopaedic surgery in the department of surgery at the Temerty Faculty of Medicine and Women’s College Hospital, Michael Catapano and Paul Marks, from the division of orthopaedic surgery in the department of surgery at the Temerty Faculty of Medicine and Sunnybrook Health Sciences Centre, Kosaran Gumarathas from the Institute of Medical Science at the Temerty Faculty of Medicine, David Wasserstein, David Lawrence and Daniel Whelan, from the division of orthopaedic surgery at Women’s College Hospital and St. Michael’s Hospital.

By Jelena Damjanovic
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KPE faculty launch campaign to ban sport betting ads in Canada

Q & A with Professor Emeritus Bruce Kidd

Ads for sports betting are everywhere — from TV screens to moving buses — and it has some experts sounding the alarm bell about their potential harms. Among them are Professor Gretchen Kerr, dean of the Faculty of Kinesiology and Physical Education, and Professors Emeriti Bruce Kidd and Peter Donnelly, who recently started a campaign to ban sports betting ads in Canada.



(Photo by iStock)

The federal government made single-event sports betting legal in 2021, arguing that the move would provide Canadians with a safe, legal and competitive online gaming market. The new rules would have the potential to bring the billions of dollars Canadians spend annually betting on single sporting events on illegal black markets back into Canada, so that the money can be monitored and taxed.

But, experts like Kerr, Kidd and Donnelly have expressed concern with the legal sports betting explosion, fueled by expensive ads for online sportsbooks. We caught up with Kidd to find out more about the group's misgivings and the campaign they launched.

What are the downsides of sports betting?

Sport gambling can lead to significant harm, including runaway debt, stress to families, low self-esteem, anxiety, depression and even suicide — among other documented economic and social issues that negatively affect Canadians. Statistics Canada recently reported that 1.6 per cent of adult gamblers in Canada, or 304,400 persons, are at moderate to high risk of gambling disorders, including mental health issues.

The American Psychiatric Association classifies addiction to gambling a 'gambling disorder', the only non-substance-related disorder so classified.

What role do sport betting ads play in exacerbating the situation?

Gambling ads — in both content and frequency — are particularly enticing to adolescents and other vulnerable persons, especially those struggling with gambling addiction. It is estimated that 10 per cent of the audience for sports on television is made up of children and youth under 18. The Australian Gambling Research Institute has reported that 'research into the advertising of other harmful products suggests advertising increases uptake and consumption, especially in the adolescent starter market.'

A recent study from the UK concluded that 'advertising policies could reduce gambling-related harms.'

Is there a difference between sports betting online and gambling in the casino?

The legal age for gambling (19+ in Ontario) can be enforced in a casino. Youngsters can and do create

false accounts or find other ways to circumvent the restrictions online.

What's the impact of sport betting on sport itself?

The exhortation to gamble demeans the spirit of sport. Instead of the athleticism, kinaesthetic beauty, ethical values, intercultural respect and communal spirit of sports, sports betting reduces meaning to whether a team or a play achieves a point spread or a within-game parley. Athletes in sports where betting is allowed are increasingly being subjected to abusive pressure placed on them by gamblers through the social media, as evidenced by the recent statements of Toronto Raptors Chris Boucher and Fred Van Vliet.

What does your campaign propose?

We seek to ban advertising for sports betting in the same way that advertising for tobacco and cannabis is banned. We also seek to prohibit the betting companies from organizing bets on the Olympic, Paralympic, amateur and educational sports in Canada.

By Jelena Damjanovic
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KPE partners with MLSE Foundation on research study detailing state of youth sports in Ontario

Ontario saw a 17 per cent decrease in access to youth sports according to the annual Change the Game research report produced in partnership between MLSE and KPE Associate Professor Simon Darnell.

Youth run on a basketball court at the MLSE Launchpad, a 42,000-square-foot facility for sport and development in downtown Toronto (Photo by MLSE Launchpad)

A new report on the state of youth sports in Ontario found a 17 per cent decrease in access compared to the previous year across various demographic groups, with social isolation and affordability reported as the greatest barriers to participation.

The annual Change the Game research report, created through a partnership between MLSE Foundation and University of Toronto researcher Simon Darnell, also cited gender, racial and household disparities as factors contributing to a lack of access to sports, with 38.5 per cent of six- to 10-year-olds reporting experiencing racism or discrimination in sports.

Overall, 36 per cent of Ontario youth reported not having access to safe places to play sports in 2023. When asked what would improve the quality of youth sports culture, the most frequent response was “an environment where I can make friends.”

“I was more disappointed than surprised by the results,” said Darnell, an associate professor in the Faculty of Kinesiology and Physical Education (KPE) and director of the Centre for Sport Policy Studies (CSPS). “We know that the COVID-19 pandemic forced some youth out of sport altogether and made sport increasingly inaccessible for others who tried to remain. And we knew that getting kids back to sport after they dropped out was going to be challenging.

“We also know that many elements or aspects of social life are increasingly inaccessible in our world today. So, what this points to is the importance of securing accessibility and inclusion as key values and policy priorities in youth sport provision.”

The Change the Game research project was conceived in 2021 as an anonymous online survey of Ontario youth about their experiences with access, engagement and equity issues in sport. The most recent study was the largest to date, with more than 10,000 survey responses – bringing the total number of youth voices collected over three years of research to 25,000.

This year, the project also collaborated with youth sport organizations, including U of T’s BIPOC Varsity Association, Toronto FC Academy, Argos Rowing Club and Ausome Ottawa, which suggested solutions to the barriers expressed by research participants in the first two years of the study.

Victor Adarquah, a PhD student in U of T’s Temerty Faculty of Medicine, was the lead research assistant on the project, receiving valuable hands-on experience in applying research to address real-world issues.

“This project was an incredible opportunity to bridge my interest in community and social impact work with research,” said Adarquah. “I found

it especially rewarding to experience the fast-paced nature and real-time application of the research findings. The work here doesn’t just sit on a shelf, it’s actively informing and shaping ongoing initiatives.”

Tanya Mruck, vice-president of community engagement and social impact at MLSE, said the data collected in the Change the Game research study will serve as an important resource that will help guide the investments and community engagement priorities of the MLSE Foundation. Study insights will also be available publicly through an online report, interactive data dashboard and open access dataset.

“What this project demonstrates is that sharing of resources and expertise through collaborations between universities and community or industry partners is both possible and beneficial,” said Darnell. “When we embarked on this collaborative project back in 2021, we wanted to better understand how youth in Ontario engage in sport in order to build a more equitable sport system for them. Along the way, it became the largest youth sports study of its kind in Canada – one which will provide sport and recreation providers, policymakers, funders and future researchers with valuable data and recommendations to change the game for the better.”

By Jelena Damjanovic
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KPE Associate Professor Tricia McGuire-Adams and Assistant Professor Janelle Joseph, in the middle, won the Outstanding Sociology of Sport Journal (SSJ) Article Award (Photo by NASSS)

KPE researchers sweep awards at North American Society for the Sociology of Sport (NASSS) conference

At the North American Society for the Sociology of Sport (NASSS) annual conference, researchers from the Faculty of Kinesiology and Physical Education (KPE) were honoured with some of the highest awards in the field.

Associate Professor Tricia McGuire-Adams and Assistant Professor Janelle Joseph, along with other members of The Re-Creation Collective, won the Outstanding Sociology of Sport Journal (SSJ) Article Award for their collective piece *Awakening to Elsewheres: Collectively Restorying Embodied Experiences of (Be)longing*.

“The work of our collective is to develop thinking, frameworks and learning tools intended to radically change the ways we think about and enact inclusion in sport, recreation and other movement cultures,” says McGuire-Adams. “It was an honour to have our research recognized with this incredible distinction.”

The paper is the first article in this field of research to take a poetic approach to transforming sport cultures, and includes both video and artwork to offer multiple access points and representations of experiences in sport, recreation community building and physical activity.

“It felt wonderful to be recognized for our co-authored work,” says Joseph, who is the founder and director of KPE’s Indigeneity, Diaspora, Equity, Anti-racism in Sport (IDEAS) research lab. “We pushed the boundaries of the kind of scholarship traditionally included in the *Sociology of Sport Journal* and for our artistic, poetic and creative interventions to be well received tells me we need to be even more bold in our calls to do things differently in academia.”

Joseph was also awarded the NASSS Research Fellowship – the first Black woman scholar to win this award – for her scholarship focusing on Black health, diaspora, leisure and community transformations using critical race theory.

“Being recognized as a NASSS Fellow is an important mark of achievement in my early career,” she said. “I’ve joined an esteemed group of scholars who are each known for distinct areas of scholarship and contributions to the field.

“I’m honoured to be counted among them and to supervise students who are also award winners shows the innovative work emerging from my IDEAS Research Lab.”



Assistant Professor Janelle Joseph was awarded the NASSS Research Fellowship
(Photo by NASSS)

Daniel Uy is a research assistant in the IDEAS research lab and current doctoral student in KPE, studying under Joseph’s supervision. He won the Barbara Brown Outstanding Paper Award for his master’s research from York University “Pride Body: Racialized Gay and Queer Men’s Physique Preparation for Canadian Pride Events.”

Uy explored why racialized queer men worked out prior to Pride events in the summer of 2022 in Toronto and Montreal. His research found that through building muscularity, racialized queer and gay men can obtain a type of social capital within the gay community, but may also increase the fetishization of their racialized bodies.

“These findings are important as they add a needed nuance to understanding working out, gym spaces and pressure from gay culture through the perspective of participants who have been neglected in this area of research up to this point,” says Uy, who is also working on a collaborative specialization in sexual diversity studies through the Mark S. Bonham Centre at U of T.

“Getting this award felt amazing,” says Uy, who credits Joseph with helping him prepare and submit his research for the master award over the summer. “I was grateful that the participants of my research were getting their lives and voices recognized by larger audiences, but also, it felt like I belonged and that I finally found the right faculty and discipline to highlight my work.”

For his doctoral work, Uy intends to continue researching the experiences of racialized queer people within health and fitness and wellness, with hopes of expanding the breadth and reach of his studies by researching and participating in the Gay Games 2026 in Valencia, Spain.



Daniel Uy, second from the right, won the Barbara Brown Outstanding Paper Award
(Photo by NASSS)

By Jelena Damjanovic
Published online 15/11/2023

TALK IT OUT, WORK IT OUT

Collaboration between U of T social work and kinesiology marries mental and physical health for local seniors



Participants in the Talk It Out, Work It Out program, jointly created and run by U of T social work and kinesiology professors and students, stretch in their chairs (Photo by Talk It Out, Work It Out)

It's Friday morning and the Jane/Finch Centre is rocking to the soca groove of Kevin Rougier and Mr. Legz.

Inside, the revelers, all of them seniors, are up out of their chairs. One 83-year-old woman, encouraged by a livewire program worker named Sandra Anderson, is leading a dance of joy.

"A lot of these people live alone," says Anderson, a senior herself. "This is their escape."

And then something magical happens. Gradually, organically, the participants doing exercises begin to sync up. What had started as a roomful of individuals, each in their own bubble, has become one thing, a team, a troupe.

Anderson is a little in awe. "I've seen so many seniors who couldn't move, wouldn't move, and now I look at them and oh my goodness," she says. "The stretching, the rubber-band work. That is a tribute to the Talk It Out, Work It Out team that came and showed them the techniques."

Talk It Out, Work It Out is a groundbreaking pilot project partnering two University of Toronto brain trusts: the

Factor-Inwentash Faculty of Social Work and the Faculty of Kinesiology and Physical Education. Graduate students from each contributed jointly to the curriculum that clients at the Jane/Finch Centre enjoyed.

"Work It Out," the sweaty part, is the bailiwick of kinesiology grad students. When the exercise is done and heart rates are returning to baseline, specially trained Master of Social Work students shepherd the clients into small groups, where they share their concerns to the degree and depth they choose. That's the "Talk It Out" part. (The third point of the triangle is the community partner, in this case the Jane/Finch Centre, which delivers the clients to the academics with a "warm handoff" of earned trust.)

Over seven 1.5-hour sessions, comfort-level rises, anxieties are de-fanged, and the double-strength action of expert tutelage and peer support delivers its therapeutic payoff. "We planned it this way so that seniors could first get activated through exercise," Lin Fang, associate professor of social work and Factor-Inwentash Chair in Children's Mental Health at FIFSW, says. "Later on, as seniors were used to the Talk It Out section and needed more time for it, we switched it around so that they could have time to speak first. The program was designed to be fully integrated."



Professor Catherine Sabiston and Professor Lin Fang

The origin story of Talk It Out, Work It Out begins at the Factor-Inwentash Faculty of Social Work, in the early months of the pandemic. A severe mental health crisis was growing in the shadow of COVID, and Fang was feeling “paralyzed and powerless” in the face of it. Hardest hit were marginalized communities, where isolation, anxiety and depression were rampant.

Fang had the idea of harnessing the knowledge and skills of Master of Social Work students to help communities that were struggling to access support. To develop the program, she first knocked on the virtual doors of community agencies, who might be willing to collaborate. After some extensive consultations, partnerships ensued and the Talk It Out Clinic was born. Students, under the supervision of professional staff and faculty members, were trained to provide free counseling sessions, via telephone or a secure online platform, to those distressed and stuck indoors. The initiative was a baby step toward what Professor Fang hoped would eventually become a full-fledged system of care, if not a rethink of how social work schools and community organizations can work together to strengthen grassroots mental health-care delivery.

For the social work students, the practical community experience was a godsend. They’d been given the opportunity to use what they’d learned in their classes, out in the “living lab” called the real world. Plus, it would count toward their practicum: Win-win!

To Professor Fang, Talk It Out was absolutely on point with for the Faculty’s mission “to increase our community impact through training and service.” And it drew deeply from her research on mental health in racialized communities. But there were still

factors hampering its potential. For example, it was apparent that some of the most at-risk groups still weren’t getting the help they needed. Many great candidates for the program didn’t want to go for therapy. For a lot of reasons, many seniors won’t go to counseling – even if it’s being offered for free. Sometimes you need to sweeten the pot.

Enter Catherine Sabiston.

As professor of exercise and sport psychology and Canada Research Chair in Physical Activity and Mental Health, she knows what a powerful elixir exercise is, not just for the body but for the mind. There are now more than 100,000 peer-reviewed studies showing that physical exercise has mental health benefits — from elevated mood to reduced anxiety to improved focus. Knowing these benefits, Sabiston had spearheaded MoveU.HappyU — an exercise and mental health coaching program overseen by KPE students from her lab to help U of T students manage their symptoms of stress, anxiety and depression. Sabiston integrated the program into a graduate class, giving students a chance to deliver exercise and mental health coaching to peers on campus. It was a little like what Professor Fang and her collaborators were doing over in the social work Faculty, but with a greater focus on physical activity.

Professors Fang and Sabiston put their heads together. “Catherine’s team had the know-how,” Fang says. Sabiston et al had already been exporting MoveU.HappyU out into the community, adapting it for a Toronto housing project whose main residents were people with serious mental illness. What if graduate students from Fang’s lab and graduate students from Sabiston’s course

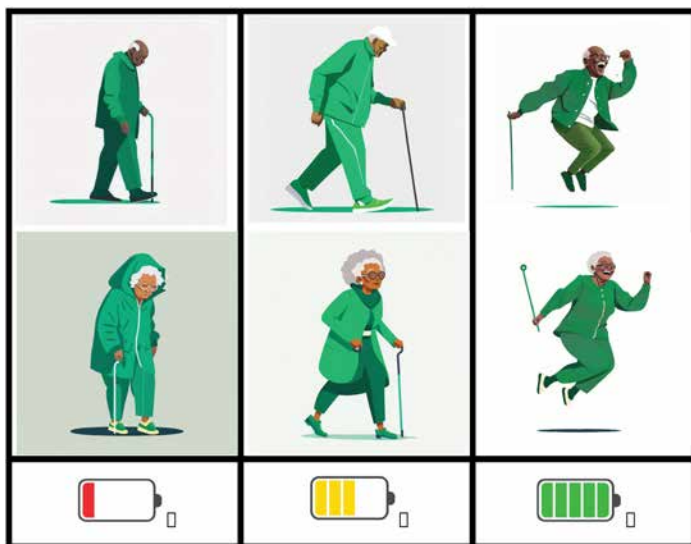
teamed up? The new joint effort would marry mental and physical health programming. If it worked, it could create infield placement possibilities for students on both sides.

But challenges remained.

The “priority populations” Professor Fang had in mind for these interventions were different from the younger populations that the programs had been developed to serve. These were seniors living in largely BIPOC communities.

“If you go to a program where they don’t seem to understand you – they’re talking differently, they’re singing songs you don’t know – you’re not going to come back,” says Fang. “We had to figure out ways to communicate that would resonate with them.”

A major cultural-sensitivity retrofit was in order. Many elements of the existing programs would have to be tweaked. For example, the folks pictured in the MoveU.HappyU workbooks were mostly young and White, which wasn’t going to fly. “The way we’ve always delivered these products is the White, Western way,” says Sabiston. Much of the therapeutic language, lingua franca of the academics, would be baffling. “We realized they’re not going to know what this 1-to-7-point Likert scale is,” Sabiston says. “So, we wondered: How can we talk about mood in a way that’s readily understandable?” Why not a little face, from smiley to frown-y, by degrees.



An image used in the Talk it Out, Work it Out workbook to illustrate the concept of energy levels

Likewise, clients seemed not so interested in things like goal-setting (a major preoccupation of the younger Western students who had participated in Sabiston’s original trials). But they did want to have more energy. Okay, great: we’ll monitor their energy levels before, during and after. But how to convey that in an instantly graspable way? Why not a picture of a battery. “Either your battery’s dead or it’s fully charged or it’s in the middle,” Fang says.

Even the concept of “therapy” itself would have to be soft-pedalled. “The idea of ‘mental health’ can be new to many people,” says Fang.

Stress? It’s the depth of the water they’re swimming in.

The majority of the participants are immigrants — from Ghana, Guyana, Indo-Caribbean countries,” Fang says. They’ve had hard lives. But they may also have a different narrative around how one deals with life’s setbacks.

“They say, ‘Hey, we just live, we suck it up, we mosey on, it is what it is,’ says Anderson. “Until somebody points out to them, ‘Your blood pressure is up because you are stressed.’ They go, ‘Really? Nah, I think it’s just something I ate.’” The idea that stress is something that can actually be something positive, even energizing, if managed strategically, is a foreign concept that’s going to have to be unpacked with gloves.

All teams agreed the program should be client-driven. “We want the seniors to feel like they have agency in the whole process,” says Sabiston. To that end, the Jane/Finch Centre asked the seniors about the personal challenges they would like to overcome. What came back was: ‘I’m lonely.’ ‘I’m anxious.’ ‘I’m in pain.’

That last item made the academics prick up their ears.

A lot of the time (though not always) pain results from prolonged inactivity. Like a car left in the garage, we lock up; we rust. The prescription is to move. But that can be a tough sell to someone who’s in pain. The last thing they may feel like doing is moving – even though it may be the thing that, ultimately, will help them the most.

“Talk It Out, Work It Out wouldn’t work without the two components — each props up the other,” says Hadi Mostofinejad, one of Professor Sabiston’s grad students and one of the lead exercise instructors. But it took a bit of trial-and-error to figure out exactly how to make the alchemy work.

In the first go-round, the “Work It Out” part came first – on the assumption that the exercise would loosen inhibitions, strengthen bonds and get everyone motivated to share their concerns. But something was off. The two parts felt disconnected. So on week three, they swapped the order: talk first, then sweat. The two components snapped together beautifully.

“Now they could tie the exercise back to the general life progress they were being coached on earlier,” Hadi says. “It was like, ‘Here’s a specific example of how you’re getting stronger and more capable. When you started you could only do ten reps of this exercise. Now you can do two sets of 15.’”

As we age, it can be challenging to co-ordinate independent muscle systems, and indeed balance was something many of the clients said they wanted to improve. “So, for example, while they were doing the bicep curls, we would ask them to take a step forward, then a step to the side, then a step back,” says Hadi. “Now they have to put their attention on both moving their hands and moving their feet. This simulates what they might encounter when, for example, getting off a bus. They have their trolley in one hand, and they’re stepping down onto the curb. Too many things are happening at the same time.”

One of the participants, who is crowding 90, took Hadi aside after class and said, “You know, this is what is keeping me coming back. These exercises make sense. This is what we do in our daily lives.”

“When they showed up on the first day,” Hadi says, “some of them had come with an advocate who said, ‘Remember... they’re old.’ And I’m thinking, Okay. But the same physiological mechanisms are in place here that everyone has. They might work slower for these participants but still exist. Their bodies are trying to improve. And the research shows there is no age limit to growth.”

“One day we were doing our sit-to-stands, and I wondered— because we’d been told to go easy on them because of their age — whether the pace was too fast. So I asked one of the participants to take over the counting. And if anything, they sped up. I thought, you know what? They have the energy. They have the will. We do not need to be overprotective here.”

“I start by saying ‘Safety comes first: if you’re feeling out of breath or off-balance, hold off. But as long as you’re feeling good, let’s go for it a little bit.’”

“Being over-conservative would not have allowed us to achieve the results we wanted to. Again, the idea that they can’t do this because they’re old: I don’t buy it. And, to be honest, neither do they. A lot of them came to this program because they felt deep down that they can still do things. And they are right. Discovering they could do more than they thought they could: that is an enormous boost to their spirits.”

* * *

Back at the Jane/Finch Centre, the songs have been sung, the dances danced, the stretch-bands stretched. And now it’s time for the back half of the double-header — the “talk it out” part. Everyone musters up into their small groups.

The subject on the table is social support. “Think about people in your life who prop you up, who give you strength,” the lead facilitator, a Master of Social Work student named Kayleigh Gladstone, says. Some of the seniors seem eager to share. Others write their answers down. A second student, Deanna Gooden, casts a headwaiter’s eye over the group. If a client isn’t able to read or write, the student will take dictation into a book that the client can keep when the eight weeks are over – a log of their progress. Through those small wins of heart and mind, “they get a confidence and momentum they can take into their life,” Fang says.

Hadi Mostofinejad and Kayleigh Gladstone, graduate students that helped deliver the program

Gladstone says she was amazed by the support the program received. “In our first session we anticipated 15 people and we doubled that and each week! These participants truly wanted to strengthen their body and minds,” she says. “And the participants became better and better able to support each other.”

Hadi Mostofinejad saw support among the participants grow throughout the program as well. Loneliness and isolation were



Hadi Mostofinejad and Kayleigh Gladstone, graduate students that helped deliver the program

recurring themes that arose in the Talk It Out sessions; many of the seniors lamented the lack of social support in their lives. “Now we are part of your support system,” Mostofinejad told the group, to broad smiles all around. Many of the participants found others to pair up with as “walking buddies” — thereby extending their health journey beyond the walls of Jane/Finch.

Here in the heart of the community, people have synced up not just physically but emotionally. Real friendships have been made.

“That’s the best part of talking it out,” Anderson says. “Everyone has a story. Your story reflects what you’re going through, but I can identify with it, too. By talking we’ve helped each other make it through another day.”

Talk It Out, Work It Out is a collaboration among University of Toronto’s Talk It Out Counseling Clinic at the Factor-Inwentash Faculty of Social Work, the Mental Health and Physical Activity Research Centre at the Faculty of Kinesiology and Physical Education, and Jane/Finch Community & Family Centre. We would like to acknowledge the generous support of Joan and Bernard Aaron for this initiative.

The Talk It Out Online Counselling Clinic, an ongoing initiative of the Factor-Inwentash Faculty of Social Work, is further made possible by generous donations from:

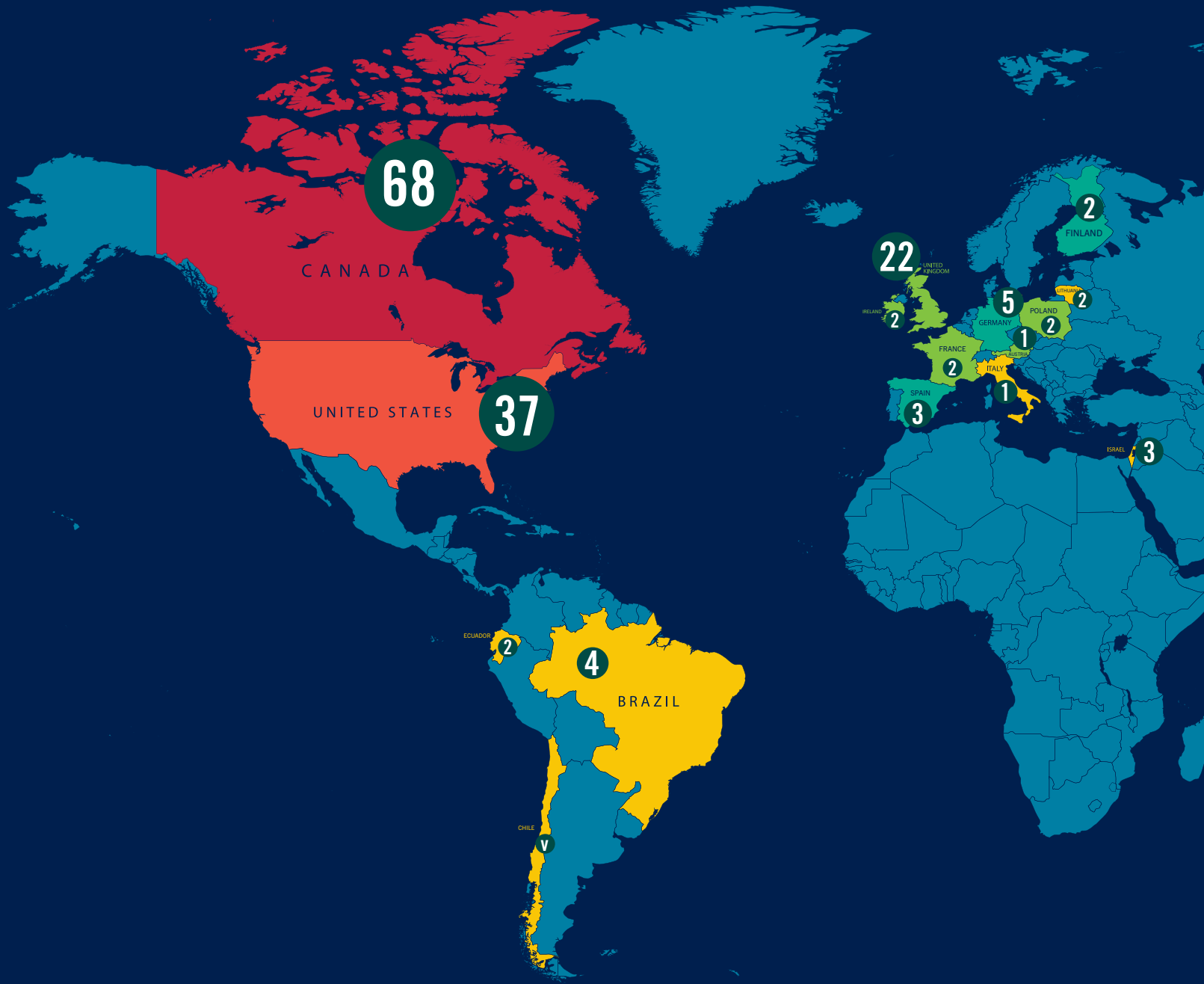
- Janis Rotman
- Ricki Blau
- William Reeves

It is also funded in part by FIFSW annual and leadership donors, who have also had an incredible impact on the program and its students.

**By Bruce Grierson
Published online 17/07/2023**

International Collaborations

A look at KPE's global partnerships



Our researchers have generated new knowledge with academics from around the world. This map shows the number of academics in each country who have contributed to the publications of our researchers.

Each year we welcome students from across Canada and around the world to our graduate programs. The 2023-2024 graduate student body was comprised of 191 students, representing nine different countries.



Bangladesh 1

Brazil 1

Canada 167

China 5

India 3

Iran 1

Taiwan 2

U.S.A. 10

Pakistan 1

KPE RESEARCH FUNDING – 2023–2024

Primary Investigator	Sponsor	Research Project Title	Amount
Amy Kirkham & Jenna Gillen	Canada Foundation for Innovation	Understanding and Treating Cancer, Cardiovascular, and Metabolic Disease in Women: A Holistic, Lifestyle Approach	\$476,999 + \$143,100
Amy Kirkham & Jenna Gillen	Ontario Research Fund	Understanding and Treating Cancer, Cardiovascular, and Metabolic Disease in Women: A Holistic, Lifestyle Approach	\$476,999
Amy Kirkham	Cancer Research Society Inc./ CIHR	Beyond Cardiotoxicity: Characterizing the Short and Long-term Cardiovascular Side Effects of Breast Cancer Endocrine Treatment	\$26,042 + \$36,458
Amy Kirkham	Diabetes Canada	The Impact of Time-restricted Eating Window Timing, Type 2 Diabetes Status and Sex on Glycemic Control	\$100,000
Amy Kirkham	CIHR	A Novel Remote Intervention to Decelerate the Age-Related Decline and Disease Development Among Older Breast Cancer Survivors	\$126,799
Amy Kirkham	CIHR	Quantifying the Cardiovascular and Metabolic Health Benefits of Canada's Physical Activity and Healthful Eating Guidelines on Pre- and Postmenopausal Women	\$134,385
Amy Kirkham	NSERC	Magnetic Resonance Imaging Techniques of Cardiac and Skeletal Muscle Tissue Characterization in Humans: Validation and Associations with Physiological Function	\$15,000 + \$12,500
Catherine Sabiston	CIHR	Disseminating the Safe Exercise at Every Stage Guideline: A Necessary Step for Enhancing Eating Disorder Care	\$5,900
Catherine Sabiston	SSHRC	Body Surveillance and Body-Related Self-Conscious Emotions, and Deficits in Cognitive and Motor Performance	\$54,700
Catherine Sabiston	SSHRC	Mindfulness, Meditation, and Movement: A Partnership to Optimize Student Well-being	\$24,895
Catherine Sabiston	SSHRC	Partnership for Equitable, Diverse and Inclusive Participation, Access, and Quality Experiences in Youth Sport (Sport4All)	\$347,620
Catherine Sabiston	SSHRC	Does Focusing on Body-Related Performance or Appearance Differentially Impact Motor Adaptation?	\$1,486
Catherine Sabiston	CRC - CIHR	Canada Research Chair (Tier II) in Physical Activity and Mental Health	\$100,000
Catherine Sabiston	New Foundations in Research Fund	Exploration of the Mechanisms and Impacts of Body Image in Virtual Reality	\$125,000
Daniel Moore	MITACS	In Vivo and Ex Vivo Anabolic Potential of Dietary Amino Acids with Exercise	\$45,000
Daniel Moore	NSERC	Mechanisms of Human Skeletal Muscle Remodeling with Exercise	\$59,000
Daniel Santa Mina	Canadian Cancer Society	EXCEL: Exercise for Cancer to Enhance Living Well	\$35,000
Daniel Santa Mina	MITACS	L2M – Validating Perioperative Solutions with PrehabRx	\$15,000

Source: RIS Award Report by Sponsor, April 1, 2023 to March 31, 2024. Faculty of Kinesiology and Physical Education.

KPE RESEARCH FUNDING – 2023–2024

Primary Investigator	Sponsor	Research Project Title	Amount
David Frost	Ontario Ministry of Labour	Exploring the Influence of an Acute Passive and Active Hip Flexion Mobility Intervention on Lifting Mechanics Amongst Firefighters	\$12,500
Dinesh Kumbhare	NSERC	Mechanisms of Neuroplasticity	\$32,000
Gretchen Kerr	Coaching Association of Canada	Addressing & Preventing Gender-Based Violence through Sport	\$46,600
Gretchen Kerr	SSHRC	A Collaborative Community-Based Educational Initiative to Address Maltreatment in Sport	\$40,000
Janelle Joseph	Connaught Fund	Mobilizing Black and Global South Women's Leadership	\$73,200
Janelle Joseph	Atlantic University Sport	Atlantic University Sport Anti-Racism & Equity	\$25,000
Janelle Joseph	The Carnegie Initiative (The CI)	Long-Term Impacts of a Hockey Coach Education Program for Racialized Youth	\$25,000
Janelle Joseph	SSHRC	Black Feminist Lab Making	\$1,486
Jenna Gillen	Dairy Farmers of Canada	Influence of Post-Exercise Greek Yogurt Consumption on 24 Hr Glycemic Control in Women with Overweight/Obesity - A Crossover Study	\$49,770
Jenna Gillen	lovate Health Sciences Inter Inc	Influence of a Novel Nutritional Supplement on Blood Glucose Regulation in Healthy Adults	\$159,328
Jenna Gillen	NSERC	Regulation of Human Skeletal Muscle Glucose Metabolism in Response to Exercise	\$33,000
Joseph Baker	SSHRC	Understanding Perceptions of Talent in Sport	\$79,761
Joseph Baker	SSHRC	Do You See What I See: Understanding Talent Selection in Sport	\$12,104
Joyce Chen	Heart and Stroke Foundation	Discovering the Potential for Motor Recovery in People Living with Stroke	\$98,040
Joyce Chen	NSERC	Understanding How to Optimize Transcranial Direct Current Stimulation for Motor Learning	\$44,000
Katherine Tamminen	SSHRC	Improving Emotion Dysregulation and Psychosocial Functioning among Competitive Athletes	\$38,233
Kelly Arbour-Nicitopoulos	Special Olympics Canada	Co-Production of a Unified Physical Education Program for High School Students with Intellectual and Developmental Disabilities in a Marginalized Community	\$20,140
Kelly Arbour-Nicitopoulos	CIHR	Effectiveness of the Wheelchair Skills Training Program for Improving Wheelchair Skills and Related Rehabilitation Outcomes Among Children and Youth	\$5,000

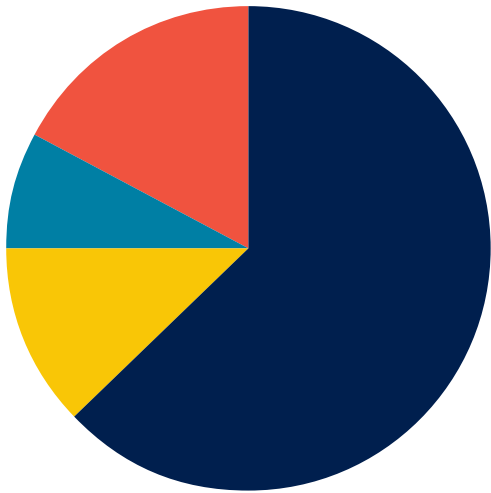
Source: RIS Award Report by Sponsor, April 1, 2023 to March 31, 2024. Faculty of Kinesiology and Physical Education.

KPE RESEARCH FUNDING – 2023–2024

Primary Investigator	Sponsor	Research Project Title	Amount
Kelly Arbour-Nicitopoulos	SSHRC	Applying a Family-Centered Research Approach to Developing and Testing Physical Activity Interventions in Children and Youth with Disabilities	\$63,170
Kelly Arbour-Nicitopoulos	SSHRC	Co-Creation of a Mental Health Intervention in Parasport	\$1,340
Kelly Arbour-Nicitopoulos	SSHRC	Applying a Family-Centered Research Approach to Developing and Testing Physical Activity Interventions in Children and Youth with Disabilities	\$20,000
Linda Trinh	CIHR	A Randomized Controlled Trial Adding Behavioral Counselling to Supervised Physical Activity in Cancer Survivors	\$100,000
Luc Tremblay	NSERC	Modulation in the Use of Multisensory Information During Voluntary Action	\$56,000
Madeleine Orr	SSHRC	After the Fire: Developing Guidelines for Return-to-Play After Wildfires	\$23,069
Michael Hutchison	Veterans Affairs Canada	Development of a Functional Test Battery for Concussion/Brain Injury to Promote Recovery and Reduce Future Risk of Potential Brain and Musculoskeletal Injuries	\$300,000
Robert Francis Bentley	NSERC	Mechanisms of Phenotypic Variance in Cardiovascular Responses to Exercise	\$33,000
Timothy Burkhart	Maple Leaf Sports and Entertainment Foundation	Early Sport Specialization and Hip Kinematics in Ice Hockey Goaltenders	\$14,730
Timothy Burkhart	MITACS	Evaluating the Effects of Fatigue and Bracing on Knee Kinematic and Kinetic Measures	\$15,000
Timothy Burkhar	NSERC	Contributions of Lower Extremity Musculature to Hip and Knee Joint Coordination, Stability, and Regional Tissue Mechanics	\$32,000
Timothy Welsh	NSERC	The Planning and Control of Movements in Social Contexts	\$39,000
Timothy Welsh	SSHRC	Are Two Better than One? Assessing the Learning and Motivational Benefits of Practicing in Pairs	\$41,162
Tricia McGuire-Adams	SSHRC	SSHRC Special Initiatives Fund: Indigenous Disability, A National and International Scope	\$7,000

Source: RIS Award Report by Sponsor, April 1, 2023 to March 31, 2024. Faculty of Kinesiology and Physical Education.

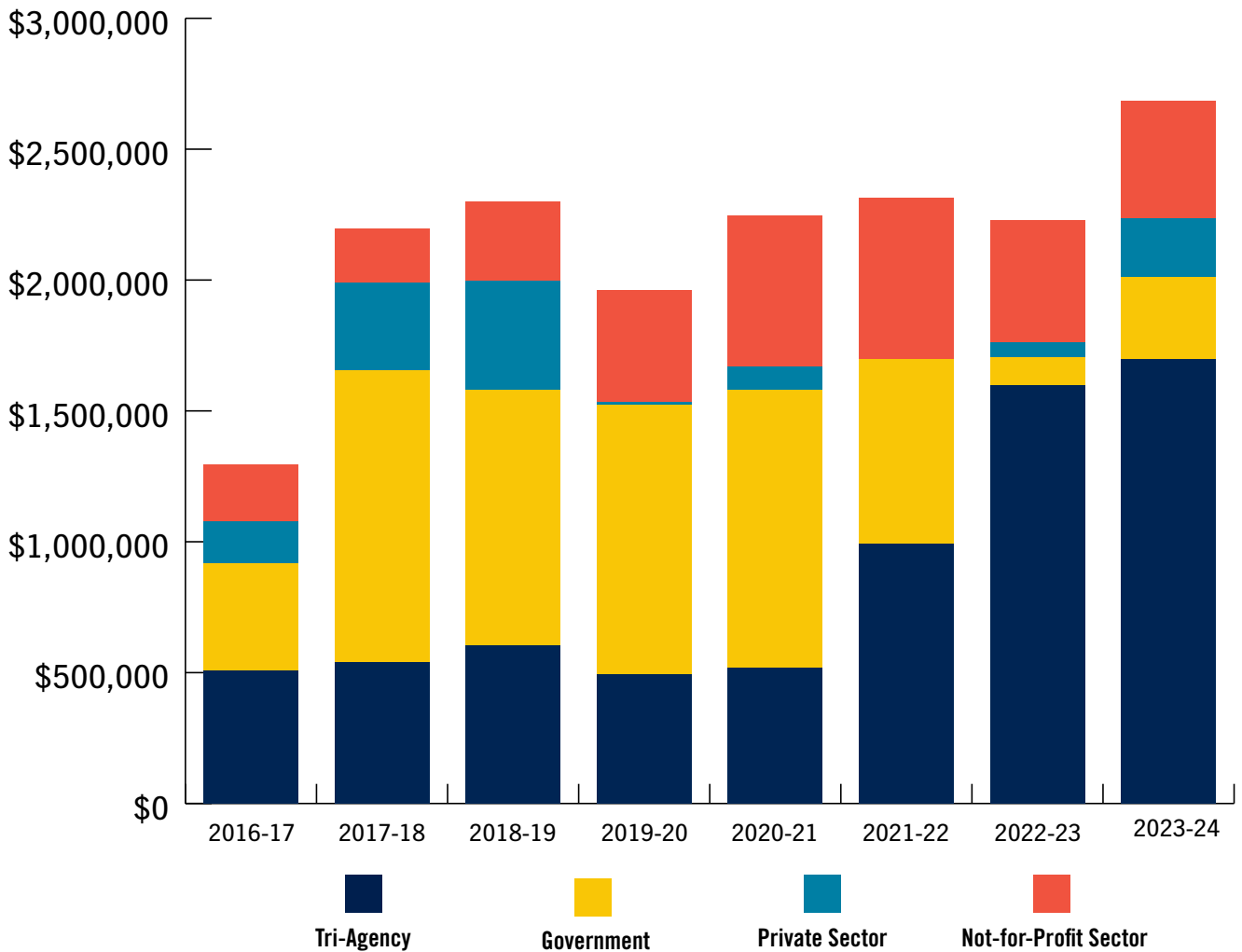
Research Funding by Year



2022-2023 FUNDING BY SPONSOR	
Tri-Agency	\$1,698,070
Not-for-Profit	\$449,022
Government	\$312,500
Private Sector	\$223,828
TOTAL	\$2,683,421

Faculty were also awarded in \$1,097,098 in infrastructure funding from federal and provincial agencies.

RESEARCH OPERATING FUNDING: EIGHT-YEAR TREND



Source: Research data cube funding by sponsor, April 1, 2023 to March 31, 2024. Faculty of Kinesiology and Physical Education.

PUBLICATIONS (2023-2024)

This list is presented in alphabetical order by first-listed author. It does not include accepted or in-press publications.

Book Chapters

Faulkner, G. E., **Trinh, L.**, & **Arbour-Nicitopoulos, K. P.** (2023). Physical activity and mental health. In P. R. E. Cocker (Ed.), *Sport and exercise psychology: A Canadian perspective* (5th ed.). Pearson Education Canada.

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Master's student Stefania Di Leo collects data in Professor Timothy Burkhart's Biomechanics of Orthopaedic Sports Medicine Lab
(Photo by Johnny Guatto)



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