

**Sports and Physical Activity Injury Research Centre  
(SPAIRC)**

Application for formal Centre status

Respectfully submitted by:

**Lori Livingston, Faculty of Health and Behavioural Sciences**  
**Moira McPherson, School of Kinesiology**  
**Susan L. Forbes, School of Kinesiology**

**Centre Members:**

Dr. Lori A. Livingston – Executive Director and Researcher, Dean Faculty of Health and Behavioural Sciences, Professor – School of Kinesiology, Lakehead University

Dr. Moira McPherson – Researcher, Deputy Provost, Professor School of Kinesiology, Lakehead University

Dr. Susan L. Forbes – Administrative Director and Researcher, Adjunct Professor, School of Kinesiology, Lakehead University

Dr. William J. Montelpare – Researcher, University of Leeds, Adjunct Professor – Faculty of Health and Behavioural Sciences, Lakehead University

Dr. Carol-Anne Sullivan – Researcher, Adjunct Professor – Department of Psychology, Lakehead University -Orillia Campus

Joanne Banfield, Manager, Sunnybrook RBC First Office for Injury Prevention

Brandy Tanenbaum, Program Coordinator, Sunnybrook RBC First Office for Injury Prevention

Dr. Neilank K. Jha, Toronto Western Hospital

Dr. Sarah Isherwood, University of Leeds

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# **1 Purpose and Relevance**

## **1.1 Introduction**

### **1.1.1 Statement of the Problem**

Engagement in physical activity, whether it is recreationally or through competitive sports, provides Canadians opportunities to pursue and maintain a healthy lifestyle. However, this involvement also exposes participants to the risk of injury and potentially threatens the health and wellbeing of participants. Therefore, “safety is an essential corollary of our global effort to promote sports and physical activity” (Verhagen & van Mechelen, 2010 158).

Sport- and physical activity-related injuries present serious implications for individual well-being as well as repercussions for the Canadian health care system. For example, approximately 4.1 million Canadians over the age of 12 suffered an injury serious enough to curb their usual activities. This represents roughly 15% of the population, a 2% increase from 2001 figures that showed 3.4 million or 13% of Canadians enduring activity restrictions due to injury. Of these, 55% of participants required medical attention within 48 hours of incurring the injury (Statistics Canada, 2009).

Additionally, sport- and physical activity-related injuries cost the Canadian health care system approximately \$188 million in direct and indirect costs (Smartrisk, 2009)<sup>1</sup>. However, this only offers a snapshot of the economic impact as the report exclusively identifies hospital reported injuries and does not account for all sports-related injuries. Also not tracked are doctor’s visits, rehabilitation costs, and the spinoff expenses faced by provincial education systems whose expenditure would likely amount to billions of dollars in economic costs directly resulting from these serious types of sports injuries. Accurately gauging the economic costs shouldered by our health and education systems as a direct result of serious sport related injuries, requires a more expansive system of data collection.

Our objective is to improve safety within sport and physical activity without significantly altering the way these activities are played. This goal is reflective of the Centre’s philosophy that is predicated on safe and healthy participation, not limited activity. We believe that enhanced understanding of the various factors related to safety in sport and physical activity will enable us to achieve this goal.

### **1.1.2 Our mission:**

- Develop an integrated interdisciplinary research team and program to examine the impact of social, economic, and physical environments on injury occurrence across the lifespan and differing types of recreational, amateur, and elite sport activities

### **1.1.3 Goals:**

- Collect and translate sport- and physical activity-related injury data into more effective injury prevention programs, policies, rules, and educational initiatives.

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<sup>1</sup> Injuries identified in this report were limited to those related to being struck by (e.g., ball, stick) or striking sports equipment (e.g., hitting boards, goal posts).

- Generate knowledge from the research undertakings that will be translated, synthesized and exchanged with public and voluntary sector safety organizations and community stakeholders.
- Support the sport and physical activity injury information needs of organizations and individuals.

#### **1.1.4 Objectives:**

- Increase the number and quality of grant applications submitted to the Tri-Council funding agencies and other granting bodies.
- Increase the involvement of other faculty and community partners in the research.
- Increase the output and dissemination of research knowledge produced by members of the Centre.

#### **1.1.5 The University Mandate and the Region:**

The Lakehead University 2007-2012 Strategic Research Plan (hereafter referred to as the SRP), positioned the University to "...be recognized regionally, nationally, and internationally as a research-intensive university. In selected preeminent areas of research, Lakehead University will become a world leader." Furthermore, the SRP unequivocally emphasizes the value of interdisciplinary research, and that such research will enable the "...University [to] contribute to the social, cultural, and economic development of the region, country and world, leading to an improved environment and health for all people." Additionally, the University's mission statement underlines the significance of "innovation" and "excellence", as well as the necessity of research opportunities to enhance the academic experience of all students.

This proposed Centre aligns with the University mandate and is based on innovative interdisciplinary collaborations, with a focus on a major public health issue that is relevant regionally, provincially, nationally, and globally. The Centre's fundamental approach is predicated on research excellence and serves to develop and sustain an applied research agenda aimed at directly improving lives of many. Members of Centre have successfully developed partnerships with research colleagues, as well as provincial and community partners, and have shown that their research is fundable and publishable.

Our proposal also aligns with most of the objectives of the SRP, including but not limited to:

- Recruiting and retaining outstanding faculty.
- Recruiting and supporting outstanding undergraduate, graduate, and post-doctoral students.
- Attracting and providing increased financial resources and infrastructure in support of research excellence and innovation.
- Facilitating individual and collaborative scholarly inquiry.
- Supporting sustainable research partnerships.
- Promoting Lakehead's research profile throughout the region, province and beyond.

Additionally, the Centre's focus on sport and physical activity related injuries, as outlined in this proposal, is consistent with a major research area identified in the Strategic Research Plan (Health Research Across the Lifespan). Injury in sport and physical activity is not new. What is new is that reports of injuries have made their way out of the sports section and into the general sections of

mainstream media. Coverage of concussions to sport-superstars is more than just identifying injury in professional sport but drawing attention to the fact that these injuries are happening in children's sport as well. Medical research in this regard is improving and what we know today about brain injury for instance is very different from what we thought 5, 10 or 30 years ago. Injury in sport, in particular, is not a requirement or a badge of honour. It can create life-long suffering and lead to debilitating medical conditions that tax our healthcare system and our personal lives as well. There is a general public sense that injuries in sport and physical activity can be better prevented, but how to (and who is to) do this is the question.

On February 8, 2011, MP Glen Thibeault (NDP) introduced Bill 616 *An Act Respecting a National Strategy to Reduce the Incidence of Serious Injury in Amateur Sport*. Of particular note, and consistent with this proposal, the Bill specifies "that a national strategy to reduce the incidence of injury in amateur sport be developed and implemented with a view to changing the existing attitudes of Canadians towards sport". The proposed legislation supports the community-based approach that is the foundation of this Centre, calling on the various athletic and health domains to work towards "the establishment of a national medical surveillance program to properly track incidence rates and the associated economic costs of injuries in amateur sport". Furthermore, on March 16, 2011, The Government of Canada announced it would be providing \$5 million over two years to support injury prevention initiatives for Canadian children and youth. The primary focus of such initiatives will include preventing major injuries such as concussions, drowning and fractures. Such an investment is also meant to leverage the work and networks of non-governmental organizations to promote the safety of children and youth across a variety of sports. By moving this Centre forward, Lakehead University will be well positioned to collaborate with other agencies, such as the Sunnybrook RBC First Office for Injury Prevention, in an effort towards achieving this national strategy. This Centre would also be positioned to work across boundaries of physical activity and geography by working with researchers from Ontario, Canada, and other countries.

The current and planned research Centre falls within the realm of the Tri-Council funding agencies. For example, work related to the Web-enabled Injury Surveillance Enterprise (WISE™) system falls under NSERC-supported activities. Psychological responses of athletes following injury (Brewer, 1994; Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998), as well as socio-cultural influences related to the normalization of injury (Coakley, 1998; Curry & Strauss, 1994; Nixon, 1993a, 1993b, 1994a, 1994b; 1996a, 1996b; Walk, 1997) fit within the SSHRC mandate. Similarly, given the nature of sport and physical activity related injuries as a public health issue (OIPRC, 2008); research exploring the public health impact of injury during sports and active recreation injury across various populations would fall under CIHR funding. Additionally, funding support from other private or public sector agencies may also be available to fund research initiatives of the Centre. Therefore, we expect the development and expansion of the Centre's research activities will involve securing research funding support from a variety of sources.

### **1.1.6 Program philosophy:**

As noted above, the fundamental philosophy of SPAIRC is the development of an integrated interdisciplinary research team and program to examine the impact of social, economic, and physical environments on injury occurrence across the lifespan and types of activities. The integration of interdisciplinary research teams and research programs is achievable by furthering

our understanding of the significant personal, social and economic burden of acute and chronic injuries sustained by Ontarians and others because of participation in sport and physical activity. While a substantial body of literature exists in the area of sports injuries, it is limited in scope because it focuses on specific sports and/or does not consider injuries arising from recreational forms of physical activity. Additionally, fundamental knowledge related to effective interventions is still an emerging aspect of this area of research. SPAIRC will provide a much-needed source of reliable sport, recreation, and physical activity-related injury data from which researchers may explore cause, effect, prevention and more. Improving the quantity and quality of injury-related research will benefit the sector as a whole. The Centre will also serve as an access point for other researchers and organizations to come together to explore mechanisms of injury and effectiveness of interventions.

We also believe that the ultimate goal, to ensure safe sport and physical activity participation, is achievable through critical and comprehensive study of the various components associated with injuries in these types of activities. Therefore, the philosophy proposed will serve to guide the research team through the examination of specific and testable research questions. The philosophy will also allow individual researchers to take the lead on projects that interest them and enable them to identify the resources and expertise required to develop the protocols necessary to answer their questions.

Through this philosophy (i.e., promoting safe sports and physical activity), we believe that the Centre will make a significant contribution to sports safety that will garner regional, provincial, national, and international recognition. Furthermore, we feel the Centre will provide all the participating researchers an opportunity to develop professionally because, while the interdisciplinary collaboration will effectively break down disciplinary silos while connecting fundamental knowledge intrinsic to every discipline.

### **1.1.7 Theoretical Framework**

Work completed through *the Centre* will be conducted from an interdisciplinary perspective and will be based on a population-based health framework. This approach examines the influence of social, economic, and physical environments (as well as the influence of personal health practices, individual capacity and coping skills, health services, human biology, and early childhood development) on the health of human populations across the life stages. The term 'determinants of health' is often used to describe the myriad of risk factors and risk conditions in the population health framework that influence health. A population-based approach also considers intervening at all possible levels of practice (Turnock 2007).

This population-based approach will be applied using an established sports injury research framework - the Translating Research into Injury Prevention Practice framework (TRIPP) (Finch, 2006). This model builds on the fact that only research that is adopted by sports participants, their coaches and sporting bodies will prevent injuries. The TRIPP model also holds that advances in sports injury prevention, and by extension physical activity-related injuries are only achievable if research efforts are directed towards understanding the implementation context for injury prevention, as well as continuing to build the evidence base relative to their efficacy and effectiveness of interventions. The six-step TRIPP model (see Table 1) requires physical activity

and sports injury researchers to think carefully about the "best" study designs and analysis tools to achieve the goal of injury reduction and elimination.

Table 1  
*TRIPP Model for Sport Injury Research*

Step	Action	Outcome
1	Injury surveillance	Counting injuries
2	Establish aetiology and mechanism of injury	Injury causes
3	Develop prevention measures	What could be done
4	“Ideal conditions”/scientific evaluation	What works
5	Develop implementation strategies in collaboration with key stakeholders	Implementation of prevention programs (e.g., education, policies, legislation), Knowledge Transfer and Exchange
6	Evaluate effectiveness of preventative measures	Prevention

*(Adapted from Finch, 2006)*

The Centre’s work will also utilize a Knowledge Transfer and Exchange Program (KTEP). The overarching primary function of the KTEP would include (but not limited to):

- Monitor, track, document and control all Knowledge Transfer and Exchange (KTE) activities and outcomes through systematic and collective processes
- Evaluate KTE activities and tools to reflect the needs of internal and external stakeholders and partners
- Demonstrate return on investment, research impact, research implementation/applications
- Collate and produce research summaries for the Centre
- Assist in the development of KTE research plans to be developed in conjunction with research proposals
- Appropriately educate, inform and train internal and external stakeholders and partners about KTE processes and strategies/models, and implementation
- Be a repository for sport and physical activity related KTE resources, tool kits, outcomes and outputs
- Organize meetings to discuss effective KTE approaches, strategies, status updates and lessons learned, share and exchange information
- Ensure that evidence-based/informed knowledge is shared with community groups, policy makers, and other stakeholders/partners
- Create opportunities and means for people from across Canada and internationally to dialogue, access information, share/exchange knowledge and ideas related to sport and physical activity related injury research and prevention
- Oversee the management and maintenance of a KTE sub-webpage on the SPAIRC website
- Assist in coordinating Communities of Practice (CoP’s)

### **1.1.8 Interdisciplinary Approach**

Historically, injury research especially that related to sports and physical activity, in Canada, has



been under funded. Consequently, a majority of investigators have limited themselves to mostly descriptive biomedical or epidemiological studies. This research has yielded valuable information about injuries. However, advancements have been incrementally small and have provided limited insight into the affect of multi-level factors on injury risk. The interdisciplinary nature of *the Centre* will provide a unique opportunity to develop a more comprehensive and multi-faceted approach to the study of injuries and their prevention, making it likely that significant advances will result. The framework for the program of research by *the Centre* – population health/determinants represents the first systematic effort to examine the influence of micro- *and* macro-level risk factors and risk conditions on injury occurrence across age groups and injury types. Having the same team involved in the study of injuries across the life span will provide opportunities to recognize unique and common risks for injuries that apply across the life span, and to develop innovative measures and/or approaches to the prevention of injury.

At this stage of the Centre's development, our research team presents expertise in the areas of public health and epidemiology, kinesiology (with an emphasis on sociology and biomechanics), psychology and neuropsychology, nursing and neuromedicine. As well, the Centre has partnered with the RBC First Office for Injury Prevention (RBCFOIP) at the Sunnybrook Health Sciences Centre. The RCBFOIP, established in 1986 and affiliated with the University of Toronto, works to prevent traumatic injuries and injury-related mortality across all ages through community education, collaboration and awareness. The RBCFOIP provides community, provincial, national and international leadership in injury prevention. This unit delivers multiple programs and resources, both independently as well as with an extensive team of collaborators

Not only will this interdisciplinary approach provide added value to traditional research disciplines, it will also allow for pursuing funding from major funding sources, as well as other agencies typically not available to strictly academic research (e.g., Ontario Trillium Foundation). Additionally, in this emerging research environment, it is essential to stimulate initiatives that can achieve the critical mass required to develop strong and productive research units.

Several strategies will be undertaken to ensure a true interdisciplinary setting. These will include:

- Regular meetings of all members (faculty, post-doctoral fellows, students, staff, external partners) to discuss current research, emerging issues, dissemination of research and stimulate interdisciplinary exchanges.
- Regular presentation by partners of their respective work.
- Invited presentations.
- Interdisciplinary representation on graduate student committees.

The Centre will also continue to extend internal and external collaborations to facilitate interdisciplinary research on injury research as it relates to sport and physical activity. These collaborations will include, but are not limited to, joint research grant applications, student projects, development of research protocols, and conducting and disseminating research.

A major advantage of the interdisciplinary team concept is the inclusion of emerging researchers and the training of highly qualified personnel. The proposed Centre will provide an environment where established and newly recruited researchers will collaborate on projects investigating sport and physical activity injury prevention and education research. Furthermore, the development of

the next generation of researchers is an important focus of this initiative. These undertakings will be enhanced through the development of the KTEP.

## **2 Life Expectancy**

Current evidence suggests that sport- and physical activity-related injuries are both on the rise and under-reported. Therefore, the data strongly suggest that these types of injuries will not be eliminated any time soon. Furthermore, it is clear that these types of activities and injuries will continue to have an impact on various aspects of Canadian society for many years. Hence, the proposed Centre would be set up for an indefinite period. This perspective aside, we hold to an ongoing quality improvement philosophy that requires regular review. Furthermore, as the Centre, the University, and society evolve, changes to the direction and approach chosen by the Centre may be needed. We therefore propose to review the Centre's core aspects based on the following steps:

Stage 1 - Annual report produced at the end of each calendar year.

This report would:

- Allow for identification of areas of success and areas where improvement could be achieved.
- Allow for comparison the Centre's performance to previous years to determine if knowledge development and increased research capacity were successfully achieved.
- Use the following elements as outcome measures for the annual report: funding, peer-reviewed publications, presentations, and number of researchers (faculty, associate members, staff) and students (graduate and undergraduate) involved in the Centre.

Stage 2 – Internal Review as per the University Policy on New Centres

This review would:

- Be carried out after the initial three (3) years of the Centre's existence and thereafter on a schedule consistent with University policy.
- Consist of a review panel appointed by the Vice-President (Research, Economic Development and Innovation). Assess the Centre's outcomes in relation to its initial goals and progress over the three-year period.
- Allow the Centre to strengthen its operations by following and implementation of the review panel's recommendations.
- Position the Centre for an external review if required.

Stage 3 – External Review

This review would:

- Be in addition to requirements under University policy in some cases
- Take place between six (6) and seven (7) years after the establishment of the Centre.
- Be carried out by an established senior researcher from the international community.
- Involve evaluation of the Centre's direction, structure, and outcomes.
- Produce a report whose recommendations would be central to the development of the strategic direction of the Centre for the subsequent five years.

### 3 Budget

The budget presented below is based on existing and proposed funding. The existing funding was awarded through the Ontario Neurotrauma Foundation’s Research Fund. Additional support will be sought through traditional funding sources (e.g., CIHR, SSHRC, NSERC), as well as funders requiring community partners such as the Ontario Trillium Foundation.

Other revenues in the form of new university contributions (e.g., overhead costs redistribution) or revenue generation (commercialization of the WISE™ system) may be realized. These funds could be used to support the hiring of a part-time Administrative Assistant. The total budget of \$620,000.00 is disbursed over a five-year period.

The main expenditures fall under the “personnel” category, primarily for the support of staff working on existing projects or projects to start in the fall of 2011. These include an Administrative Director, a Post-Doctoral Fellow, and several Research Assistants. Travel expenses will cover staff travel to conferences and visiting scholars. Minimal expenses for equipment and supplies are expected, although an initial expenditure of \$26,000 is required in Year 1 for the installation of a server to support injury surveillance data collection for the Play It Safe initiative (see below).

Table 2: Proposed Budget Requirements (5-year period)

Expenditures	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Personnel						
Administrative Director	57000	58000	59000	60000	60000	294000
Post-Doctoral Fellow (1)			40000	40000	40000	120000
Research Assistants (@\$7500 ea)	15000	15000	15000	15000	15000	75000
Administrative Assistant (PT)			15000	15000	15000	45000
Travel (staff, invited lecturers)	10000	10000	10000	10000	10000	50000
Technologies and Supplies	28000 <sup>2</sup>	2000	2000	2000	2000	36000
Total	110000	85000	141000	142000	142000	620000

<sup>2</sup> This amount reflects the purchase of a server to support data collection and storage for the WISE system.

Table 3: Secured Funding

Source	Year 1	Year 2	Year 3	Year 4	Year 5	Total
ONF	130000					130000

Table 4: Funding Applied For

Source	Year 1	Year 2	Year 3	Year 4	Year 5	Total
OTR		72000	41800	41800		154600 <sup>3</sup>

### 3.1 Potential Funding Sources

In order to sustain and strengthen the Centre's activities and infrastructure, we will look into both traditional and non-traditional sources of funding. We believe that one of the strengths of the Sport and Physical Activity Injury Research Centre initiative is its ability to appeal to both fundamental and practical science funding sources, including partnerships with sport and physical activity stakeholders. All grants would be secured under the Centre's umbrella to generate overhead revenues where possible.

Table 5: Potential Sources of Grants/Funding and Targeted Research Initiatives

Sources of Grants/Funding	Targeted Research Initiatives	Proposed Timeline for Applications
Canadian Institutes of Health Research	Concussion Detection Assessment	Fall, 2012
Canadian Foundation for Innovation	Play Safe Initiative – Expanding WISE™ Component; Concussion Detection Assessment	Fall 2011; Fall 2012
Ontario Neurotrauma Foundation	Play It Cool	Current
Private Donor in Alliance with Canadian Spinal Research Organization (CSRO)	Play It Cool	Summer 2011
Sunnybrook RBC First Office For Injury Prevention	LU-SPAIRC	Winter 2012
Ontario Trillium Foundation	Play Safe Initiative	Fall 2011
National Institutes of Health (NIH)	Concussion Detection Assessment	Fall 2012
Forzani Foundation	LU-SPAIRC	TBD
BFL Canada	LU-SPAIRC	Summer 2011

Currently, members of the centre are working with two organizations (Private Donor/CSRO and BFL Canada) in exploring financial support of the centre. The first organization, an unidentified private donor working with the CSRO, has approached members of the Play It Cool Research group with a request to develop proposal to take this program to scale (e.g., more sports, beyond Ontario). These negotiations are currently underway. The second organization, BFL Canada, is a major insurance provider for sports and leisure activities (e.g., Equine Canada, Hockey Canada). BFL has expressed an interested in The Centre's work related to the Play Safe Initiative and has

<sup>3</sup> Budget discrepancies would be addressed by pursuing private sector funding.

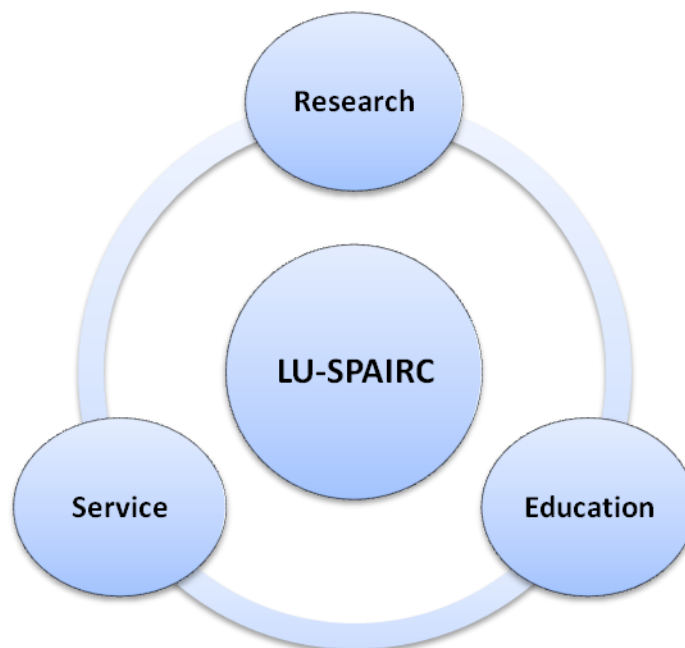
agreed to review a business proposal to establish a more formal relationship. This proposal, being prepared with the assistance of the Lakehead University Advancement Office, includes the possibility BFL Canada being the title-sponsor for the research centre. BFL Canada is a major insurance provider for sports teams and associations (e.g. Hockey Canada) throughout the country.

Other potential sources include charitable foundations that support research into health-related issues for youth. One foundation we are currently pursuing is the Forzani Group Foundation which provides support for qualified parties whose activities “involve the promotion of physical fitness, health and wellness, the prevention and relief of sickness and disability, or the participation and education in sports across Canada” (see <http://www.forzanigroup.com/FGLfoundation.aspx>).

Finally, SPAIRC’s relationship with Sunnybrook RBC First Office for Injury Prevention is part of a provincial strategy to establish the Ontario Injury Prevention Research Unit (OIPRU) as a provincially-based research network. A major objective of this initiative is to have OIPRU recognized as a Canadian and international leader in injury prevention research; monitoring and evaluation; teaching and training; and as a respected source of science-based information on injury prevention. This network will be comprised of multidisciplinary teams, each with their own area of expertise. As such, Sunnybrook RBCFOIP has recognized Lakehead University’s proposed SPAIRC as the lead for its injury research, education and prevention initiative as it relates to sport and physical activity. Once established, it is anticipated that the OIPRU will have the capacity to support the lead research groups in carrying out their mandate (e.g., support in kind, financial support).

#### **4 Course of Action for the First Three Years**

The development of the Centre will adopt a three prong approach:



**The education function** refers to the development, deployment, and delivery of all aspects of safe sport/recreation pursuit curriculum. To this end, two key approaches will be developed and implemented. The first involves expanding the Play It Cool program to address the needs of other sports/recreation activities by working with designated individuals from each of the constituent member groups of the PSI to create activity specific curriculum related to safe participation. Through these working relationships the repositories of Play it Cool will grow and evolve to include the most relevant information which can be delivered through visual (videos and animations), auditory (podcasts) and text mediums (blogs, discussion boards, web-pages). The second approach involves developing relevant web-based curricula for health-care practitioners in an effort to provide relevant information related to sports and recreation injuries.

**The service function** refers to the development of Play Safe Initiative taking on a registrar function in that it will become the clearinghouse for all participants that complete the various elements of the Play It Cool program and in so doing assign credentialing to such participants. By creating a standardized program of safe sport/recreation curriculum that is completed by participants in a timely/organized way, coaches, parents, and players can compare and be evaluated against norm and criterion referenced standards of achievement which will provide the benchmarks for best practices within an area of sport or recreation.

For the development phase of the Centre, we propose to focus on three areas of research: one related to education for safe sports/physical activity participation, the second targeting injury surveillance, and the third concentrating on evaluating concussion tests. These areas of research are presented in more detail below.

These activities are geared towards the development of a body of knowledge about safety in sport and physical activity. Following the model presented above we propose to focus initially on three research projects and involve various members of the Centre and as well as outside collaborators. Our rationale for choosing the projects was based on the following criteria: 1) ability to build on existing projects; 2) availability of equipment and resources; 3) availability of expertise; 4) development of projects in each of these areas; 5) ability to develop projects rapidly in the event of a successful application; and, 6) focus on breadth of participation across the lifespan.

These projects are linked to safe sports and physical activity participation and entail the development of a body of fundamental knowledge. The first project, currently underway, focuses on educating coaches with regard to safe hockey practices and was developed to provide further knowledge on the efficacy of an online-facilitated curriculum. The second proposed project was developed to enhance our understanding of sport- and physical activity-related injury by tracking their occurrence, prevalence and aetiology through web-enabled surveillance. Project three is an examination of the efficacy of sideline instruments to assess the presence or absence of concussions in athletes.

On their own, each of the projects will contribute to an emerging body of knowledge about injuries and safety in sport and physical activity. However, within the context of the Centre, these projects will form the backbone from which we will expand our research activities at both the fundamental and applied levels while considering participants in both competitive sports and recreational activities, as well as across age groups.

#### **4.1 Project 1 - Play It Cool™ Facilitated Online Curriculum Delivery for Coach Preparation in Teaching Safety and Injury Prevention in Sport Participation**

The use of the web to deliver information in a structured curriculum is an emerging modality, and more specifically the delivery of instructional courses “online” to a cohort such as coaches continues to be a work in-progress. What this means is that as part of the responsibility for curriculum design, delivery, and evaluation we must adopt a style and technology that ensures that the community of participants will be able to gain the best learning experience possible. To this end, members of our research group have created a safe hockey curriculum with “e-links” to references from other resources and various styles of multimedia, as well as including higher-level computer programming to enable the learner to gain more useable information from online resources and our customized curriculum modules.

In addition to the development of subject specific curriculum, our research group has spent a considerable amount of time developing the plan for the flow of information and the direction that facilitators follow in presenting safe hockey curriculum to coaches. In particular, a guiding principle of the interactive approach used in our facilitated online curriculum delivery program is that the concepts are conveyed at the most elementary but comprehensive level, so that consumers, as active learners, can build knowledge.

Finally, the collaborative research team has also developed observation tools by which to access the efficacy of the online curriculum in changing behaviours associated with injurious actions in sports. The Play It Cool™ program is funded by the Ontario Neurotrauma Foundation and is currently finishing year one of a two-year study.

Members with roles, expertise:

The project is supported by experts in epidemiology and statistics (Lori A. Livingston, William J. Montelpare [University of Leeds]) Curriculum design and evaluation (Moira McPherson, Susan L. Forbes), observational studies in sport (Lori A. Livingston, Susan L. Forbes, Joe Baker [York], Jessica Fraser-Thomas [York], neuropsychological function (Michelle Keightley, Nick Reed [University of Toronto]) and concussion awareness (Aaron Rosenbaum [Penn State]). The entire group was responsible for identifying the relevant surveys for use, refinement of the protocol, and supervision of the students to be involved.

Funding Source: Year 2 of study funding secured from Ontario Neurotrauma Foundation through to March 2012. Additional funding to move Play It Cool to Scale is being sought from an unidentified private sector donor in conjunction with the Canadian Spinal Research Organization.

#### **4.2 Project 2 - Play Safe Initiative and Web-enabled Injury Surveillance Enterprise (WISE™)**

The *Play Safe Initiative* (PSI) is a collaborative group responding to the urgent call from government and non-government organizations concerned about the significant personal, social and economic burden of acute and chronic injuries sustained by Ontarians resulting from participation in sport and physical activity. Members of this group include: Sunnybrook Health Sciences Centre and RBC First Office for Injury Prevention, the Dr. Tom Pashby Sports Safety Fund, University of

Leeds – School of Healthcare, Lakehead University – Faculty of Health and Behavioural Sciences, Leisure Information Network, Ontario Hockey Federation, Ontario Basketball Association, Ontario Cycling Association, Ontario Soccer Association, Sport Information Resource Centre, York Region Public Health, Sport 4 Ontario, Ontario Recreation Facilities Association, Ontario Physical Health and Education Association, Mount Royal University, Alberta Sport Development Centre, City of Toronto – Community Partnerships, The Children’s Breakfast Club, and the Canadian Standards Association – Technical Committee. This collaboration will allow the PSI to develop further the Web-enabled Injury Surveillance Enterprise (WISE™) which will serve as the foundation for data collection and analysis that will support research and the development of consistent resources, programs, education and policy with an aim to reduce and prevent injury.

The WISE™ platform has evolved from work generously supported by the Ontario Neurotrauma Foundation and the Canadian/American Spinal Research Organization’s Play It Cool Program. Similarly, the system is being developed to function as a web interfaced relational database and knowledge translation system within the area of falls prevention research. Development of the WISE™ system is based on the intention to create a national and international web-based approach to information dissemination that addresses best practices in various sport and recreationally based injury prevention strategies. It is anticipated that, as a web-based system, WISE™ will become the accepted platform across which international partners can collaborate, establish uniform definitions and problem specific approaches to data collection, as well as to compare high-risk behaviours, the efficacy of training methods, and the appropriateness of injury prevention equipment.

The structure of the WISE™ system will facilitate the creation of multi-national research special interest groups that can work with healthcare practitioners and service users (sport/recreation participants) to develop new strategies for injury prevention. Yet at the local level, the system enables the interdisciplinary collaboration between various caregivers throughout the injury prevention, treatment and rehabilitation process. Additionally, the system not only collects data about specific characteristics related to injury conditions, but provides information directly to the community of stakeholders, which include: researchers, physicians, therapists, and trainers, as well as policy planners, administrators, and coaches/teachers, parents, participants, officials, and both government and NGO personnel. As an electronic platform, the WISE™ system will become a destination for researchers and stakeholders to share information and ask questions that are relevant to their specific interests.

In addition to establishing a web-enable injury surveillance system, the research team will be working on mobile applications development (i.e., apps) that can be used on small low-power handheld devices such as personal digital assistants, enterprise digital assistants or mobile phones. Development of these apps is to facilitate timely (or real-time) reporting of injuries.

The development and implementation of WISE™ is both critical and timely as the existence of similar systems in Canada is limited. To date, the main injury surveillance system is the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP). This emergency room based system that operates in 10 pediatric and six (6) general hospitals. Data collected via CHIRPP provides only a snapshot of the sports injury issue as it only identifies hospital reported injuries and does not account for all sport-related injuries. In contrast, WISE™ as a front-line data surveillance system



would broaden the scale of injuries reported and provide greater understanding of their aetiology and impact.

Members with roles, expertise:

The development of the WISE™ system is joint project between Lakehead University and the University of Leeds (William J. Montelpare). As with the first project, the PSI/WISE™ venture draws on areas of expertise epidemiology and statistics (Lori A. Livingston, William J. Montelpare [University of Leeds]). Additional support with respect to data collection involves several members of the PSI group identified above. Governance of the project, as per the Trillium Foundation guidelines, will be provided by the Dr. Tom Pashby Sports Fund. Management of the research aspect, along with recruitment and supervision of graduate students, will be carried out by Lakehead University (Susan L. Forbes). It is anticipated that some of these students will come from the Software Engineering program at Lakehead and they will be responsible for working with the PSI partners to develop the WISE™ apps. Knowledge transfer and exchange, as well as health informatics, will be a key components of this work (Carol-Anne Sullivan).

Funding Source: Application submitted to the Ontario Trillium Foundation July 2011, anticipated start date 2012.

#### **4.3 Project 3 - Physiological and Cognitive Test Assessment**

Sports-related concussion and issues related to post concussion events have gained prominence, as they have become a major focus of injury prevention in recreational pursuits that have a demonstrated high risk of neurotrauma across all age levels. For example, cycling, downhill skiing/snowboarding, skateboarding, and rugby without the use of a helmet have all exhibited the lethal consequences of head injury among participants. In the short term, these injuries can cause loss of productivity through absenteeism, mental health symptoms such as depression, anxiety, and irritability, as well as loss of memory and disorientation. In the long term, the effects of these injuries are suggested to be the precursors to dementia.

Many athletes are given a preliminary assessment using The Sport Concussion Assessment Tool (SCAT) that is a commonly used paper neurocognitive tool. However, there is still debate as to whether this is the most effective tool for assessing concussions in athletes as it relies on self-reporting. Other forms of testing include computerized neuropsychological testing which is playing an increased role in the assessment process. These tests, such as CogState (Australia) and Immediate Post-Concussion Assessment Cognitive Test (ImPACT) (US), are used to assess neurocognitive function (i.e., verbal and visual memory, motor processing speed, and reaction time) and concussion symptoms. However, there is some question as to which is the most effective for a) providing immediate indication of concussion symptoms and b) assessing an athlete's healthy return to activity.

The purpose of this project is to evaluate and compare a variety of neurocognitive tests to determine their effectiveness as a sideline assessment tool and a return to play measure. The tests being examined include the King-Devick (K-D) test that involves an athlete reading single digit numbers displayed on index-sized cards. The test is designed to capture impairments of eye

movement, attention, language and other symptoms of impaired brain function that may be indicative of concussion. Another test to be examined is ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing), a 20-minute computerized concussion evaluation system, designed to assess multiple aspects of cognitive functioning in individuals suspected of being concussed. A third protocol under consideration is the Balance Error Scoring System (BESS) test, a balance test consisting of six (6) timed tests used to assess balance after a suspect head injury. The final tool being considered is the Contralateral Acoustic Suppression of Transient Evoked Otoacoustic Emissions (CAS TEOAE), an audiological assessment technique developed at the University of Leeds (England). This test is a sideline test designed to determine whether a suspected concussion has led to a reduction in the CAS TEOAE level, compared to a specified base line level.

Members with roles, expertise:

The project will be supported by experts in cognition (Lori Livingston), human biology/physiology (William Montelpare, Sarah Isherwood (University of Leeds), Neurophysiology and Medicine (Neilank Jha), King-Devick test (Susan Forbes), biomechanics (Lori Livingston, Moira McPherson), and cognitive neuropsychology (Carol-Anne Sullivan).

Funding Source: Ontario Neurotrauma Foundation, anticipated application date 2012

#### **4.4 Project 4 – Assessing Physician Awareness of Concussion**

This study will examine a physician's (e.g., Family Physician, General Practitioner) knowledge of the concussion guideline identified in the concussion assessment and return to play guidelines identified in the Consensus Statement on Concussion (Zurich, November 2008). Using surveys that combine questions related to symptoms of concussion, acute evaluation methods and return to play protocols, physician's responses will be compared to the benchmarks identified in the Zurich Concussion Statement.

Members with roles, expertise:

The project will be facilitated by experts in epidemiology and statistics (Lori A. Livingston, William J. Montelpare [University of Leeds]), survey design (Lori A. Livingston, Susan L. Forbes, William J. Montelpare [University of Leeds]), neuropsychological function and concussion guidelines and protocol (Michelle Keightley, Nick Reed [University of Toronto], Neilank Jha, M.D. [Toronto Western Hospital]) and concussion awareness (Grant Lum, M.D., Aaron Rosenbaum [Penn State]). The entire group will be responsible for developing the research protocol and supervision of the students to be involved.

Funding Source: Physician Services Foundation - Medical Education Research & Development Grant, anticipated application date December 2011 for June 2012 decision.

## **5 Commitments by Lakehead University**

The University commitments will not differ from current commitments to individual faculty members. These will include the typical services provided to faculty members by the Research Office, Finance, Human Resources, Physical Plant, and others departments.

## **6 University Facilities**

### **6.1 Current Facilities**

The proposed centre currently has space in 874 Tungsten. This space is sufficient for accommodating the daily administrative activities, as well as supporting the activities of the executive director, visiting scholars, and graduate students.

### **6.2 Anticipated Facilities**

The Tungsten space is sufficient for the current needs of the centre, however, it may be necessary to move as renovations are carried out at Tungsten.

## **7 Membership**

It is expected that members of the Centre will be active researchers who demonstrate scholarly excellence in fundamental and applied research of relevance to the Centre's mandate. The Centre will also facilitate the mentoring of new faculty members in order to strengthen and expand existing research programs. The proposed initial membership represents a unique combination of expertise at various appointment levels and across disciplines.

Regarding the different types of memberships in the Centre, we propose to have "Full", "Associate", and "Student" membership categories. Full membership would require an academic appointment (including adjunct) from Lakehead University and a research interest in sport and physical activity related injury research. Associate membership would be reserved for academics from other institutions or professionals involved in sport and physical activity safety of relevance to the Centre's mandate. Students actively working with a Full member of the Centre on a project of relevance would be considered "Student" members automatically.

Other individuals could apply to join the Centre at the Full or Associate level. The process would include a nomination from an existing Full member, the support of the Executive Director, and a 2/3 support by existing full members. The Administrative Director would circulate the applicant's curriculum vitae for a period of two weeks prior to the formal vote; the Executive Director would oversee the voting process but would only cast a ballot to break a tie.

### **7.1 Full Members**

Dr. Lori A. Livingston – Researcher, Dean Faculty of Health and Behavioural Sciences, Professor – School of Kinesiology, Lakehead University

Dr. Moira McPherson – Researcher, Deputy Provost, Professor School of Kinesiology, Lakehead

University

Dr. William J. Montelpare – Researcher, University of Leeds, Adjunct Professor – Faculty of Health and Behavioural Sciences, Lakehead University

Dr. Susan L. Forbes – Research Director and Researcher, Adjunct Professor, School of Kinesiology, Lakehead University

Dr. Carol-Anne Sullivan – Researcher, Adjunct Professor – Department of Psychology, Lakehead University -Orillia Campus

## **7.2 Associate members**

Joanne Banfield - Collaborator, Manager, Sunnybrook RBC First Office for Injury Prevention

Brandy Tanenbaum - Collaborator, Program Coordinator, Sunnybrook RBC First Office for Injury Prevention

Dr. Sarah Isherwood - Collaborator, University of Leeds

Dr. Neilank K. Jha- Collaborator, Toronto Western Hospital

## **7.3 Collaborations**

We believe the nature and scope of this interdisciplinary research initiative will not only strengthen existing collaborations, but lead to new academic and community partnerships in the near future. The team is actively involved in on-going collaborations with many researchers from other institutions (see projects 4.1 – 4.4 and members with role). We will continue to foster the existing collaborations and endeavour to expand on them. Involvement of these individuals, and others, in the Centre (e.g., graduate student supervision) will be encouraged and consideration for Associate Membership will be explored. In addition, the Centre would seek to enhance existing and/or develop formal links with other groups involved in research on sport and physical activity injury prevention (e.g., Sunnybrook RBC First Office for Injury Prevention, Canadian/American Spinal Research Organization, and Mayo Clinic concussion initiative (Ice Hockey Summit: Action on Concussion)).

## **8 Governance**

As per the University policy on Centres, SPAIRC “...will operate with an internally appointed management committee and an externally appointed advisory committee. The management committee will include the Executive Director (ex officio) and two members of the faculty. The management committee will meet on a quarterly basis. The management committee will initially be populated by senior members of the Centre (i.e. full professor) on a voluntary basis and will serve a three (3) year term. Once this initial term expires, Management Committee members will be elected by the Centre’s membership at an Annual General Meeting and/or by electronic ballot. The advisory committee, appointed by the management committee, will include the Director (ex officio), three members of the faculty, community partners, and be chaired by the Vice-President (Research Economic Development and Innovation) or his/her designate. The advisory committee shall meet at least once a year.” Stakeholder representatives for the advisory committee will be identified within the first three months of the Centre being established.

## **9 Employment Opportunities**

Employment opportunities will be created by using current grant funding, securing additional external peer-reviewed funding, and seeking external contracts and internal support from the university. Most of the employment opportunities will be for research positions (e.g., Undergraduate/Graduate Students, Research Assistants, Research Associates, Post-Doctoral Fellows) while some may be for support capacity (e.g., Administrative Assistant). The initial staff of the Centre will include the personnel currently engaged in research directly related to the mandate of the Centre. As new grants are secured, we will evaluate the need to expand this complement.

## **10 Personnel**

### **10.1 Human Resources Matters**

Typically, personnel will be hired by, and will report to the Administrative Director and Principal Investigator of the relevant research project. In situations where someone with a Ph-D is hired, the Principal Investigator, the Executive Director, and the Administrative Director will investigate the possibility of applying for an Adjunct appointment for the incumbent in the most relevant academic department. In situations where individuals are hired through internal funding in a support capacity for the Centre as a whole, the hiring will be made through the management committee and these individuals will report to the Administrative Director who will assume the supervision responsibilities.

### **10.2 Student Involvement**

Students will be recruited from the following academic units: Kinesiology (HBKin, MSc), Psychology (HBA/HBSc, MA/MSc, PhD), Health Sciences (MPH, MHSc), and Education (BEd, MEd, PhD). The majority of the doctoral students recruited for the Centre would fall under the proposed PhD program in Health Sciences or the existing PhD program in the Faculty of Education. To stimulate interdisciplinary research, we would require that any supervisory committee include members from at least two (2) different academic units.

## **11 Legal Implications, Intellectual Property and Commercialization of Intellectual Property**

The Centre will function as a sub-unit of the university with the inherent protection from legal liability provided by the institution and its insurance. While we foresee no legal implications with the proposed Centre itself, there may be implications by the research conducted as is typical of university-based research. Most of the work will rely on human participants where legal implications are always present. Nonetheless, these implications would not be different if the research were conducted outside the auspices of the Centre. Furthermore, all work conducted will be approved by the Research Ethics Board and will adhere to the Tri-Council guidelines. Additional contract work or initiatives related to commercialization may also have legal implications. While there are such activities taking place currently, involvement in these activities would only take place after consultation with the Vice President (Research, Economic Development and Innovation) or his/her designate, the relevant academic authorities, and the

University Lawyer.

The development of the WISE™ is being proposed as part of a broader sport and recreation injury surveillance initiative. While centralized at Lakehead University, the system is also a set of “tools and approaches” that allow surveillance data collected by one partner to be shared with other stakeholders according to agreed-upon and known procedures and rules. This would lead to enhanced capacity and quality. The ongoing development of WISE™ requires agreement on roles and responsibilities, use of data including principles to ensure security and privacy rights, as well as governance and coordinating mechanisms (NHSNWG, 1999).

### **11.1 Intellectual Property**

Members of the Centre are bound by employment contracts from the institutions that employ them. As such, the ownership of intellectual property created and developed through research associated with employment is governed by the individual member’s employment contracts. Furthermore, depending on conditions attached to funding from external sources for individual research projects, the ownership of intellectual property by members will be handled on a case-by-case basis.

### **11.2 Commercialization of Intellectual Property**

As members of the Centre, intellectual property created or developed may be commercialized with the assistance of the Economic Development and Innovation Management Office (ED-IMO) at Lakehead University. Issues such as intellectual property ownership and commercialization revenue and expense sharing will be handled on a case-by-case basis.

## **12 Conclusions**

The Sport and Physical Activity Injury Research Centre would represent a strong interdisciplinary commitment to research excellence in an area of considerable importance for Northwestern Ontario and Canadian society. This dynamic partnership across disciplines builds upon existing research infrastructure while creating original and exciting opportunities for established and new researchers. The initiative would also provide a unique and exciting bridge between academic researchers and community partners to address issues of importance to all segments of the population. Support of the Centre may prove valuable to attract new faculty and graduate students and to place Lakehead University at the forefront of emerging research areas in sport and recreation-related injury prevention.

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Appendix A  
Letters of Support

Susan L. Forbes, PhD  
Adjunct Professor, School of Kinesiology and  
Injury Research Project Manager,  
Faculty of Health and Behavioural Sciences  
Lakehead University  
Thunder Bay, ON

March 8, 2011

Dear Susan,

I am pleased to provide support and encouragement of the development of the Lakehead University Sports and Physical Activity Injury Research Centre (SPAIRC) on behalf of the Sunnybrook Health Sciences Centre RBC First Office for Injury Prevention.

It is through collaboration with partners like SPAIRC that we can reduce the risk of traumatic injury in sport and recreation activities. In this light, Sunnybrook Health Sciences Centre aims to establish the Centre for Leading Injury Prevention, Practice and Education (CLIPPER) within the next 12 months. CLIPPER will be the beacon for injury research in Ontario and will span across the injury domains (motor vehicle, falls, suicide, sports and recreation, etc). Each domain will require interdisciplinary leadership and we are confident that SPAIRC will provide the model for all other domains.

In the development of the Play Safe Initiative (PSI), SPAIRC will provide the leadership required to investigate injury data sharing amongst stakeholders (parents, participants, coaches, trainers, educators, recreation leaders, administrators and officials). This project is multi-sectoral and will bring together leaders from education, sport, recreation and health in Ontario. As the lead research institute, SPAIRC will oversee all research activities related to the PSI and development of the Web-based Injury Surveillance Enterprise (WISE™). Both PSI and WISE™ will fundamentally alter the way in which injury data is shared, analyzed and used to inform evidence-based interventions including policy development and education.

Injury in sport has often been portrayed in the media as a right of passage or symbol of weakness. In part due to the work of researchers at Lakehead University, the people of Ontario understand that injury is not "accidental" but can be prevented. Working with members of parliament to develop legislation for the surveillance of injury in sport has helped to elevate this issue beyond the sport pages and recent media coverage of Lakehead University researchers on radio programs and before Parliament Committee has provided this topic the much needed attention of the public and decision makers.

Once again, we are pleased to be able to pursue the goal of safe and healthy physical activity in Ontario with SPAIRC and look forward to developing this field of research jointly.

Yours sincerely,



Joanne Banfield, RN, BA  
Manager, RBC First Office for Injury Prevention  
Sunnybrook Health Sciences Centre



Michael Gravelle, M.P.P./député  
Thunder Bay - Superior North  
Thunder Bay - Superior-Nord

August 5, 2011

Dr. Susan Forbes Research Project Manager  
Sport & Physical Activity Injury Prevention  
Lakehead University  
Thunder Bay, ON P7B 5E1

Dear Dr. Forbes,

Thank you for providing me with the information on the Play Safe Initiative. I am impressed by this cooperation between Ontario partners in health care, sport and recreation, and research and academia, all done in the interest of public health and safety. I am also pleased that Lakehead University is participating in this important provincial undertaking.

I agree with you that the Play Safe Initiative is fully congruent with the ongoing efforts undertaken by the Ministry of Health Promotion and Sport to encourage physical exercise and activity, while preventing injury. I must say that maximizing the benefits of sports and recreation, while finding ways to prevent the physical costs, is a very sound approach.

I have visited the [playsafeinitiative.ca](http://playsafeinitiative.ca) website, and it looks as though this ambitious project is ready to proceed. I wish you every success in securing financial support from public and private funding agencies and foundations, and please feel free to use this letter as my statement of endorsement and support for the Play Safe Initiative.

Yours, sincerely,

Michael Gravelle, MPP  
Thunder Bay-Superior North

Minister of Northern Development, Mines and Forestry

cc The Hon. Margaret Best Minister  
Ministry of Health Promotion & Sport  
777 Bay St. 18th Floor  
Toronto, ON M7A 1S5