

Christian A. Clermont, PhD

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EDUCATION

Ph.D. Kinesiology **2019**

University of Calgary, Calgary, Alberta

Thesis: *Making Sense of Sensor Data for Recreational and Competitive Runners: Typical and Atypical Running Biomechanics*

Advisor: Dr. Reed Ferber, Faculty of Kinesiology, University of Calgary

M.Sc. Kinesiology **2015**

University of Regina, Regina, Saskatchewan

Thesis: *The Effect of Knee Osteoarthritis on the Variability & Fractal Dynamics of Human Gait*

Advisor: Dr. John Barden, Faculty of Kinesiology & Health Studies, University of Regina

B.Kin – Fitness & Lifestyle (Honours) **2010**

University of Regina, Regina, Saskatchewan

Honour's Thesis: *The Effect of Decreased Breathing Frequency on Stroke Parameters in Competitive Swimming*

Advisor: Dr. John Barden, Faculty of Kinesiology & Health Studies, University of Regina

ACADEMIC AWARDS & SCHOLARSHIPS

Total Amount Awarded: \$177,000

Research & Scholarship:

- AI:TF Graduate Student Scholarship (\$24,000), 2017-2019. (Top-up to NSERC PGS-D)
- NSERC Postgraduate Scholarship – Doctoral (\$42,000), 2017-2019
- Queen Elizabeth II Graduate Scholarship (\$15,000), 2017 (Declined due to NSERC)
- University of Calgary, Kinesiology Dean's Doctoral Studentship (\$80,000), 2015-2019
- University of Regina, FGSR Graduate Scholarships (\$12,000 total), 2011 & 2012

Teaching & Leadership:

- University of Regina, Faculty of KHS Outstanding Graduate Student Award, 2015
- University of Regina New Faculty Teaching Award of Recognition (\$1,000), 2014

Travel & Conferences:

- University of Calgary, Faculty of Kinesiology Presentation Award (\$1,000), 2017
- University of Calgary, FGS Travel Award (\$1,500), 2017
- University of Regina, FGSR Graduate Travel Award (\$500), 2013

PROFESSIONAL EXPERIENCE

Postdoctoral Associate **July 2019 - Present**
University of Calgary, Kinesiology

SHRED Concussions Research Project: *Quantifying head impact biomechanics and mechanisms of sport-related concussion in youth athletes.*

Advisor: Dr. Darren Stefanyshyn, Faculty of Kinesiology, University of Calgary

Sessional Instructor **September 2018 - Present**
University of Calgary, Kinesiology

- Human Anatomy & Physiology (KNES 259 & 260)
- Laboratory Practicum – Human Anatomy Dissection (KNES 460)

Anatomist **May 2019 – Present**
University of Calgary, Cumming School of Medicine

- Advanced Technical Skills Simulation Laboratory

Head Teaching Assistant (Lab Coordinator) **September 2015 - April 2019**
University of Calgary, Kinesiology

- Human Anatomy & Physiology (KNES 259 & 260)

Research Assistant **April 2017 - May 2018**
Active & Safe BC – Running-Related Injuries

- Phase 1: Completed a literature review (incl. evidence synthesis framework and full report) on running-related injuries that included the following information:
 - prevalence/incidence of the burden of injury associated with running
 - risk and protective factors associated with running
 - effective interventions (policy, program, etc.) targeting running-related injuries
 - evidence associated with implementing and evaluating interventions in running
- Phase 2: Translated information from Phase 1 into a template that populated an on-line tool for the main *Active & Safe* project deliverable (<https://activesafe.ca/running/>). The on-line tool is a digital platform for sport and recreation injury information that is designed with sport-specific sections intended for coaches, players, and parents.

Research Assistant **March 2015 - August 2015**
Regina Qu'Appelle Health Region, Research & Performance Support

- Completed a literature review, ethics, grant application to study the effects of 3D multiple object tracking perceptual-cognitive training in patients with multiple sclerosis.
- Completed study protocols to (1) investigate the effect of omental transposition on kidney function in partial nephrectomy and (2) explore the relationship between different sizes and types of uterine fibroids and the levels of inflammation in the uterus.
- Prepared a research proposal to (a) develop a mobile app for teachers to monitor students' return-to-learn progress after a concussion event.

Sessional Instructor **January 2013 - June 2015**
University of Regina, Kinesiology & Health Studies

- Research Methods in KHS (KIN 220)
- Lifestyle, Health, & Wellness (KIN 170)
- Personal Fitness & Wellness (KHS 135)
- Biomechanics (KIN 285)
- Seminar in KHS (KHS 100 & KIN 101)
- Human Physiology (KIN 267 Online)

Research Assistant
University of Regina, Centre for Teaching & Learning

July 2012 - August 2014

- Organized and implemented a variety of workshops for faculty and educators
- Organized a month-long teaching and learning program for visiting faculty from Mexico
- Organized Summer Teaching Institutes on Course (Re)Design and Blended Learning
- Performed general pedagogical research and tasks (e.g., Turnitin policies and procedures; Aboriginal teaching initiatives in Canadian Universities; and Teaching International Students at the University of Regina).

Student Assistant
University of Regina, Kinesiology & Health Studies

December 2012 - April 2013

- Support to the Associate Dean (Graduate Studies and Research): Updates of web information and graduate program marketing materials; the creation of the KHS graduate studies newsletter.

PUBLICATIONS

Journal Articles (Published)

15. **Clermont, C.A.**, Pohl, A.J., & Ferber, R. (In Press, 2019). Fatigue-related changes in running gait patterns persist in the days following a marathon race. *Journal of Sport Rehabilitation*. Manuscript ID: JSR.2019-0206.
14. **Clermont, C.A.**, Benson, L., Edwards, W.B., Hettinga, B.A., & Ferber, R. (In Press, 2019). New considerations for wearable technology data: Changes in running biomechanics during a marathon. *Journal of Applied Biomechanics*. doi: <https://doi.org/10.1123/jab.2018-0453>
13. **Clermont, C.A.**, Duffett-Leger, L., Hettinga, B.A., & Ferber, R. (2020). Runners' perspectives on 'smart' wearable technology and its use for preventing injury. *International Journal of Human-Computer Interaction*, 36(1), 31-40. doi: <https://doi.org/10.1080/10447318.2019.1597575>
12. Ahamed, N.U., Benson, L.C., **Clermont, C.A.**, Pohl, A.J., & Ferber, R. (2019). New considerations for collecting biomechanical data using wearable sensors: How does inclination influence the number of runs needed to determine a stable running gait pattern? *Sensors*, 19, 2516. doi: <http://dx.doi.org/10.3390/s19112516>.
11. **Clermont, C.A.**, Phinyomark, A., Osis, S.T., & Ferber, R. (2019). Classification of higher- and lower-mileage runners based on running kinematics. *Journal of Sport and Health Science*, 8(3), 249-257. doi: <https://doi.org/10.1016/j.jshs.2017.08.003>
10. Benson, L.C., **Clermont, C.A.**, Watari, R., Exley, T., & Ferber, R. (2019). Automated accelerometer-based gait event detection during multiple running conditions. *Sensors*, 19(7), 1483. doi: <https://doi.org/10.3390/s19071483>
9. Ahamed, N.U., Kobsar, D., Benson, L., **Clermont, C.**, Osis, S.T., & Ferber, R. (2019). Subject-specific and group-based running pattern classification using a single wearable sensor. *Journal of Biomechanics*, 84(14), 227-233. doi: <https://doi.org/10.1016/j.jbiomech.2019.01.001>
8. **Clermont, C.A.**, Benson, L.C., Osis, S.T., Kobsar, D., & Ferber, R. (2019). Running patterns for male and female competitive and recreational runners based on accelerometer data. *Journal of Sports Sciences*, 37(2), 204-211. doi: <https://doi.org/10.1080/02640414.2018.1488518>

7. Ahamed, N., Kobsar, D., Benson, L., **Clermont, C.**, Kohrs, R., Osis, S.T., & Ferber, R. (2018). Using wearable sensors to classify subject-specific running biomechanical gait patterns based on changes in environmental weather conditions. *PloS ONE*, 13(9): e0203839. doi: <https://doi.org/10.1371/journal.pone.0203839>.
6. Benson, L.C., **Clermont, C.A.**, Bošnjak, E., & Ferber, R. (2018). The use of wearable devices for walking and running gait analysis outside of the lab: A systematic review. *Gait & Posture*, 63, 124-138. doi: <https://doi.org/10.1016/j.gaitpost.2018.04.047>
5. Benson, L.C., **Clermont, C.A.**, Osis, S.T., Kobsar, D., & Ferber, R. (2018). Classifying running conditions using a single wearable sensor: Optimal segmentation and feature extraction methods. *Journal of Biomechanics*, 71(11), 94-99. doi: <https://doi.org/10.1016/j.jbiomech.2018.01.034>
4. Macaulay, C.A.J., Osis, S.T., **Clermont, C.**, & Ferber, R. (2017). The use of real-time feedback to improve kinematic marker placement consistency among novice examiners. *Gait & Posture*, 58, 440-445. doi: <http://dx.doi.org/10.1016/j.gaitpost.2017.08.040>
3. **Clermont, C.A.**, Osis, S., Phinyomark, A., & Ferber, R. (2017). Kinematic gait patterns in competitive and recreational runners. *Journal of Applied Biomechanics* 33(4), 268-276. doi: <https://doi.org/10.1123/jab.2016-0218>
2. Barden, J.M., **Clermont, C.A.**, Kobsar, D., & Beauchet, O. (2016). Accelerometer-based step regularity is lower in older adults with bilateral knee osteoarthritis. *Frontiers in Human Neuroscience*, 10(625). doi: <https://dx.doi.org/10.3389/fnhum.2016.00625>
1. **Clermont, C.A.** & Barden, J.M. (2016). Accelerometer-based determination of gait variability in older adults with knee osteoarthritis. *Gait and Posture*, 50, 126-130. doi: <http://dx.doi.org/10.1016/j.gaitpost.2016.08.024>.

REFEREED CONFERENCE PROCEEDINGS

16. **Clermont, C.A.**, Agnew, L., Benson, L., & Ferber, R. (2019, July). *Using Wearable Technology Data to Detect Atypical Running Patterns with Injury: A Case Report*. Oral presentation at the XXVII Congress of the International Society of Biomechanics, Calgary, AB.
15. Benson, L.C., **Clermont, C.A.**, Pohl, A.J., & Ferber, R. (2019, July). *Greater Medial-Lateral Regularity for Treadmill vs. Outdoor Running Observed in Males but Not Females*. Oral presentation at the XXVII Congress of the International Society of Biomechanics, Calgary, AB.
14. Ahamed, N.U., Benson, L.C., Pohl, A., **Clermont, C.A.**, & Ferber, R. (2019, July). *Does a Stable Running Pattern Remain Stable during Different Elevation Conditions?* Poster presentation at the XXVII Congress of the International Society of Biomechanics, Calgary, AB.
13. **Clermont, C.**, Benson, L., Osis, S., Kohrs, R., Johnston, A., & Ferber, R. (2018, July). *Subject-Specific Running Profiles to Quantify Biomechanical Changes throughout a Marathon Race*. Oral presentation at the 8th World Congress of Biomechanics, Dublin, IRE.
12. Kobsar, D., Johnston, A., Kohrs, R., Osis, S., **Clermont, C.**, Jacob, C., & Ferber, R. (2018, July). *Validity of a Novel Method to Track Vertical Oscillations in Runners using Microsoft Kinect v2 Depth Data*. Poster presentation at the 8th World Congress of Biomechanics, Dublin, IRE.
11. Benson, L., Kobsar, D., **Clermont, C.**, Osis, S., & Ferber, R. (2018, June). *A Machine Learning Approach to Predicting Running-Related Pain Using Wearable Technology*. Poster presentation at the CASEM Annual Symposium, Halifax, NS.

10. Ahamed, N.U., Benson, L., **Clermont, C.**, Osis, S.T., & Ferber, R. (2017). Fuzzy inference system-based recognition of slow, medium, and fast running conditions using a triaxial accelerometer. *Procedia Computer Science*, 114, 401-407.
9. Macaulay, C.A.J., Osis, S.T., **Clermont, C.**, & Ferber, R. (2017, August). *Real-Time Feedback to Improve Marker Placement Consistency among Novice Examiners*. Poster presentation at the 41st Meeting of the American Society of Biomechanics, Boulder, CO.
8. **Clermont, C.**, Benson, L., Osis, S., Kobsar, D., & Ferber, R. (2017, July). *The Use of a 3D Accelerometer to Quantify Subject-Specific 'Typical' and 'Atypical' Running Gait Patterns*. Poster presentation at the XXVI Congress of the International Society of Biomechanics, Brisbane, QLD.
7. Benson, L., **Clermont, C.**, Osis, S., Kobsar, D., & Ferber, R. (2017, July). *Exploring Segmentation and Feature Extraction Methods for Classifying Running Conditions using 3D Accelerometers*. Oral presentation at the XXVI Congress of the International Society of Biomechanics, Brisbane, QLD.
6. **Clermont, C.**, Kobsar, D., Benson, L., Osis, S., & Ferber, R. (2016, November). *The Use of Wearable Technology to Monitor Subject-Specific Running Gait Patterns*. Poster presentation at the 11th Annual Sport Innovation Summit, Calgary, AB.
5. Phinyomark, A., Osis, S., **Clermont, C.**, & Ferber, R. (2016, July). *Differences in Running Mechanics between High- and Low-Mileage Runners*. Abstract presented at the European Society of Biomechanics Annual Conference, Lyon, France.
4. **Clermont, C.**, Kobsar, D., & Barden, J. (2016, July). *The Use of 3D Accelerometry to Investigate Step Time Variability and Asymmetry in Bilateral Knee Osteoarthritis*. Poster presentation at the 19th Meeting of the Canadian Society for Biomechanics, Hamilton, ON.
3. Phinyomark, A., Kobsar, D., Osis, S., **Clermont, C.**, & Ferber, R. (2016, July). *Gender Differences in Gait Kinematics in Competitive and Recreational Runners*. Poster presentation at the 19th Biennial Meeting of the Canadian Society for Biomechanics, Hamilton, ON.
2. **Clermont, C.**, Reed, J., Dash, M., & Barden, J. (2014, July). *Step and Stride Time Variability in Older Adults with Knee Osteoarthritis*. Poster presentation at the 7th World Congress of Biomechanics, Boston, MA.
1. **Clermont, C.** & Barden, J.M. (2013, October). *The Effect of Knee Osteoarthritis on the Variability and Fractal Dynamics of Human Gait*. Poster presentation at the 42nd Annual Scientific Meeting of the Canadian Association of Gerontology, Halifax, NS.

RESEARCH REPORTS

- **Clermont, C.**, Black, A., Richmond, S.A., Pike, I., & Babul, S. *Evidence Summary: Running*. Active & Safe Central. BC Injury Research and Prevention Unit: Vancouver, BC; 2018. Available at <https://activesafe.ca/running/>.

PATENTS

- Kobsar, D., Ferber, R., Osis, S.T., **Clermont, C.**, & Benson, L.C. (2017). *U.S. Patent No. 62586565*. Washington, DC: U.S. Patent and Trademark Office.

GUEST LECTURES

- *The Hobbyjogger Index: Monitoring Gait Patterns for Recreational and Competitive Runners*. Guest lecture for University of Calgary KNES 603 – Innovations in Wearable Technology, taught by Dr. Reed Ferber. September 26, 2019.
- *Making Sense of Sensor Data: Detecting Typical and Atypical Running Patterns*. Guest lecture for University of Calgary KNES 213 – Introduction to Research in Kinesiology, taught by Dr. Venus Joumaa. October 17, 2018.
- *Aging and Postural Control*. Guest lecture for University of Regina KIN 380 – Advanced Motor Behaviour, taught by Dr. Kerri Staples. October 15, 2014.
- *Experiences as a KHS Master's Student*. Guest lecture for University of Regina KHS 800 – Graduate Seminar, taught by Dr. Shanthi Johnson. October 26, 2013.

INVITED PRESENTATIONS

- *Making Sense of Sensor Data for Runners: Typical and Atypical Running Patterns*. Seminar presentation for the University of Calgary Human Performance Laboratory Seminar Series, Calgary, AB. June 2019.
- *Using Wearable Technology to Evaluate Gait*. Workshop presentation at “Becoming a gait specialist: Insights from a clinically oriented 3D motion analysis system” event of the Pedorthic Association of Canada, Calgary, AB. October 2016.
- *New Biomechanical Technologies to Improved Sport Performance*. Workshop presentation at the Saskatchewan Coaches Conference of the Coaches Association of Saskatchewan, Saskatoon, SK. May 2014.
- *Prezi*. Workshop presentation at the University of Regina Kinesiology and Health Studies Graduate Student Society Workshop Series, Regina, SK. March, 2014.
- *Lessons Learned: Advice from an Experienced T.A.* Workshop presentation at the University of Regina Graduate Teaching Development Days, Regina, SK. September, 2013.
- *The Hiring Process*. Workshop presentation for the University of Regina Kinesiology and Health Studies Graduate Student Society Workshop Series, Regina, SK. March, 2013.

POPULAR PRESS INTERVIEWS / CONTRIBUTIONS

- Brunswickan – UNB Student Newspaper. (2018, September 24). UNB track team is excited about wearable technology research in Calgary. Retrieved from <https://www.thebruns.ca/articles/unb-track-team-is-excited-about-wearable-technology-research-in-calgary>
- Outside Magazine. (2018, August 6). *The Automatic Hobbyjogger Detection Machine*. Retrieved from <https://www.outsideonline.com/2332596/hobbyjogger-running-study-accelerometer-injury>

PROFESSIONAL DEVELOPMENT

MOOC Concussion: Prevention, Detection and Management

2019

- Offered by Université Laval and the University of Calgary, this MOOC demystifies concussion and explains how everyone can play a role in the prevention, identification, and management of this type of traumatic brain injury. The course also describes the revision and implementation of a concussion management protocol adapted to different environments. It was developed to meet the needs of parents, coaches, teachers and administrators of school and sport environments, health care professionals, and athletes/individuals that have experienced a concussion.

Machine Learning by Stanford University on Coursera

2016

- This course provides a broad introduction to machine learning, data mining, and statistical pattern recognition. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI).

Graduate Student Teaching Development Badge

2016

Taylor Institute for Teaching and Learning, University of Calgary

- Designed to provide educational development for graduate students about the roles, responsibilities, and skills required of a teaching assistant at the University of Calgary.

Graduate Citation in University Teaching

2012

Centre for Teaching and Learning, University of Regina

- This course provided information about various pedagogical strategies for teaching at the university level.

PROFESSIONAL AFFILIATIONS

- Student Member, American College of Sports Medicine
- Student Member, International Society for Biomechanics
- Student Member, Canadian Society for Biomechanics

JOURNAL REVIEW ACTIVITIES

- Gait & Posture
- Journal of Aging and Physical Activity
- Journal of Biomechanics
- Journal of Healthcare Engineering
- Research Quarterly for Exercise and Sport
- Sports Biomechanics

VOLUNTEER AND COMMITTEE INVOLVEMENT

Mentor **September 2019 - Present**
Kinesiology Mentorship Program

Mentor **September 2017**
NSERC Peer Mentorship Program

Evaluator - Awards Committee **2016 - 2018**
University of Calgary, Graduate Students' Association

Member at Large - Kinesiology Graduate Students' Association **2016 - 2018**
University of Calgary, Kinesiology

Member at Large - Kinesiology & Health Studies Graduate Students' Society **2012 - 2013**
University of Regina, Kinesiology & Health Studies

Hiring Committee **January 2013 - March 2013**
University of Regina, Kinesiology & Health Studies

COMMUNITY AND VOLUNTEER ACTIVITIES

Volunteer – Drop-In ESL Tutor **August 2017 - February 2018**
Calgary Immigration Educational Services

Assistant Coach **November 2016 - February 2017**
The Canadian Tire First Shift Hockey Program

Assistant Coach **August 2012 - October 2014**
Regina Minor Football & Regina Riot Football, WWCFL