

Michael Baggaley

Curriculum Vitae

2007 5th Ave. NW
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EDUCATION

- 2022 Ph.D. University of Calgary, Calgary, AB
Faculty of Kinesiology
Graduation Date: Fall 2022
Concentration: Biomechanics
Thesis: “Musculoskeletal Loading During Graded Running.”
Advisor: W. Brent Edwards, Ph.D.
- 2014 M.S. University of Kentucky, Lexington, KY
Department of Kinesiology and Health Promotion
Graduation Date: Fall 2014
Concentration: Biomechanics
Thesis: “Is There a Relationship Between Hip Structure, Hip Muscle Strength, and Lower Extremity Frontal Plane Kinematics During Treadmill Running?”
Advisor: Michael B. Pohl, Ph.D.
- 2011 B.S. Mercyhurst University, Erie, PA
Sports Medicine Department
Graduation Date: Spring 2011
Major: Athletic Training

PROFESSIONAL EXPERIENCE

Employment

- 2022 - **Post-Doctoral Fellow** – Faculty of Kinesiology - University of Calgary
- 2022 - **Contract Faculty** – Department of Health and Physical Education – Mount Royal University
- 2016 - **Graduate Teaching/Research Assistant** – Faculty of Kinesiology - University of Calgary
- 2014 - 2016 **Lab Manager/Research Specialist** - Human Movement Analysis Lab - East Carolina University
- 2012 - 2014 **Graduate Research Assistant** - Biodynamics Lab - University of Kentucky

Teaching

- 2022 **Biomechanics** (Mount Royal University, Laboratory Instructor, Undergraduate Level). Basic knowledge and application of the mechanical principles that govern human movement, including force system analysis, work-energy, impulse-momentum, and muscle mechanics.
- 2022 **Quantitative Biomechanics** (University of Calgary, Teaching Assistant, Undergraduate Level). Basic principles of force system analysis, impulse-momentum, work-energy, and particle kinematics applied to biological structures, including extensive mathematical analyses.
- 2020 **Quantitative Biomechanics** (University of Calgary, Lead Teaching Assistant, Undergraduate Level). Basic principles of force system analysis, impulse-momentum, work-energy, and particle kinematics applied to biological structures, including extensive mathematical analyses.
- 2013 **Biomechanics of Human Movement** (University of Kentucky, Laboratory Instructor, Undergraduate Level). Introductory course on the mechanics of human movement, with emphasis on exercise, sport, and physical activity.

Internships

- 2011 **Research Intern** - Biomechanics Lab - Shriners Children's Hospital - Erie, PA

Marking Assistant

- 2017 – 2018 **Cognition and Learning in Human Movement** (University of Calgary, Marking Assistant, Undergraduate Level). An examination of cognitive science and its contribution to understanding human movement.

AWARDS

- 2022 Faculty of Kinesiology Presentation Award – University of Calgary
- 2021 3rd Place – Best Paper Award – European Journal of Sport Science
- 2021 Faculty of Kinesiology Presentation Award – University of Calgary
- 2020 Nominated for Student's Union Teaching Excellence Award – University of Calgary
- 2020 Dr. Benno Nigg Distinguished Faculty Achievement Graduate Scholarship – University of Calgary
- 2020 – 2021 Dean's Doctoral Scholarship – University of Calgary
- 2019 – 2020 Faculty of Graduate Studies Doctoral Scholarship – University of Calgary

- 2019 Graduate Student of the Year – Human Performance Lab, University of Calgary
- 2019 Faculty of Kinesiology Presentation Award – University of Calgary
- 2018 – 2019 Queen Elizabeth 2 Award – University of Calgary
- 2018 Faculty of Graduate Studies Travel Award – University of Calgary
- 2018 Faculty of Kinesiology Presentation Award – University of Calgary
- 2018 – 2019 Kinesiology Leadership Scholarship – University of Calgary
- 2017 Faculty of Kinesiology Presentation Award – University of Calgary
- 2017 – 2018 Queen Elizabeth 2 Award – University of Calgary
- 2016 McCaig Institute Alberta BME Conference Travel Award
- 2016 – 2017 Queen Elizabeth 2 Award – University of Calgary
- 2015 Student Travel Award – University of Kentucky – KHP
- 2014 ACSM Biomechanics Interest Group – Student Travel Award
- 2014 Student Travel Award – University of Kentucky – KHP
- 2008 – Member of Phi Eta Sigma Honor Society
- 2009 – 2011 Member of Iota Tau Alpha Athletic Training Honor Society
- 2008 – 2009 Mercyhurst University Deans List scholar

RESEARCH

Peer-Reviewed Manuscripts

- Khassetarash, A., Haider, I.T., **Baggaley, M.**, Edwards, W.B. (2022). Tibial strains during prolonged downhill running: a finite element analysis. *Journal of Biomechanical Engineering*, 145, 0141007.
- Bruce, O.L., **Baggaley, M.**, Khassetarash, A., Haider, I.T., Edwards, W.B. (2022). Tibial-fibular geometry and density variations associated with elevated bone strain and sex disparities in young active adults. *Bone*, 161, 116443.
- Baggaley, M.**, Derrick, T.R., Edwards, W.B. (2022). Sensitivity of Internal Tibial Forces and Moments to Static Optimization Moment Constraints at the Subtalar and Ankle Joints. *Journal of Biomechanical Engineering*, 145, 011008.

- Tong, J., Subramani, V., Kote, V., **Baggaley, M.**, Edwards, W.B., Reifman, J. (2022). Effects of Body Size and Load Carriage on the Running Biomechanics of Healthy Men. *IEEE Transactions on Biomedical Engineering*. (In review).
- Khassetarash, A., Vernillo, G., **Baggaley, M.**, Millet, G.Y, Edwards, W.B. (2022). The Repeated Bout Effect Influences Lower-Extremity Biomechanics During a 30-min Downhill Run. *European Journal of Sport Science*. (EPub ahead of print).
- Baggaley, M.**, Derrick, T.R., Vernillo, G., Millet, G.Y, Edwards, W.B. (2022). Internal Tibial Forces and Moments During Graded Running. *Journal of Biomechanical Engineering*, 144, 011009.
- Bruce, O.L., **Baggaley, M.**, Welte, L., Rainbow, M.J., Edwards, W.B. (2021). A Statistical Shape Model of the Tibia-Fibula Complex: Sexual Dimorphism and Effects of Age on Reconstruction Accuracy From Anatomical Landmarks. *Computer Methods in Biomechanics and Biomedical Engineering*, 25, 875-886.
- Unnikrishnan, G., Xu, C., **Baggaley, M.**, Tong, J., Kulkarni, S., Edwards, W.B., Reifman, J. (2021). Effects of Body Size and Load Carriage on Lower-Extremity Biomechanical Responses in Healthy Women. *BMC Musculoskeletal Disorders*, 22, 1-11.
- Meardon, S.A., Derrick, T.R., Willson, J.D., **Baggaley, M.**, Steinbaker, C.R., Marshall, M., Willy, R.W. (2021). Peak and Per-Step Tibial Bone Stress During Walking and Running in Female and Male Recreational Runners. *American Journal of Sports Medicine*, 49, 2227-2237.
- Khassetarash, A., Vernillo, G., Martinez, A., **Baggaley, M.**, Giandolini, M., Horvais, N., Millet, G.Y, Edwards, W.B. (2020). Biomechanics of Graded Running: Part 2 – Joint Kinematics and Kinetics. *Scandinavian Journal of Medicine and Science in Sports and Exercise*, 30, 1642-1654.
- Vernillo, G., Martinez, A., **Baggaley, M.**, Khassetarash, A., Giandolini, M., Horvais, N., Edwards, W.B., Millet, G.Y. (2020). Biomechanics of Graded Running: Part 1 – Stride Parameters, External Forces, Muscle Activations. *Scandinavian Journal of Medicine and Science in Sports and Exercise*, 30, 1632-1641.
- Baggaley, M.**, Esposito, M., Xu, C., Unnikrishnan, G., Reifman, J., Edwards, W.B. (2020). Effects of Load Carriage on Biomechanical Variables Associated With Tibial Stress Fractures in Running. *Gait and Posture*, 77, 190-194.
- Haider, I.T., **Baggaley, M.**, Edwards, W.B. (2020). Subject-Specific Finite Element Models of the Tibia With Realistic Boundary Conditions Predict Bending Deformations Consistent With in Vivo Measurement. *Journal of Biomechanical Engineering*, 142.
- Xu, C., Reifman, J., **Baggaley, M.**, Edwards, W.B., Unnikrishnan, G. (2020). Individual Differences in Women During Walking Affect Tibial Response to Load Carriage: The Importance of Individualized Musculoskeletal Finite-Element Models. *IEEE Transactions on Biomedical Engineering*, 67, 545-555.
- Baggaley, M.**, Vernillo, G., Martinez, A., Horvais, N., Giandolini, M., Millet, G.Y., Edwards, W.B. (2019). Step Length and Grade Effects on Energy Absorption and Impact Attenuation in Running. *European Journal of Sports Science*, 20, 756-766.
- Willy, R.W., DeVita, P., Meardon, S.A., **Baggaley, M.**, Womble, C.C., Willson, J.D. (2019). Effects of Load Carriage and Step Length Manipulation on Achilles Tendon and Knee Loads. *Military Medicine*,

184, e482-e489.

Greco-Otto, P., **Baggaley, M.**, Edwards, W.B., Léguillette, R. (2019). Water Treadmill Exercise Reduces Equine Limb Segmental Accelerations and Increases Shock Attenuation. *BMC Veterinary Research*, 15, 329.

Esculier, J.F., Willy, R.W., **Baggaley, M.**, Meardon, S.A., Willson, J.D. (2017). Sex Specific Kinetic and Kinematic Indicators of Medial Tibiofemoral Force During Walking and Running. *The Knee*, 24, 1317-1325.

Willy, R.W., Willson, J.D., Clowers K, **Baggaley, M.**, Murraray, N. (2016). The Effects of Body-Borne Loads and Cadence Manipulations on Patellofemoral and Tibiofemoral Joint Kinetics During Running. *Journal of Biomechanics*, 49, 4028-4033.

Baggaley, M., Willy, R.W., Meardon, S.A. (2016). Primary and Secondary Effects of Real-Time Feedback to Reduce Vertical Loading Rate During Running. *Scandinavian Journal of Medicine and Science in Sports and Exercise*, 27, 501-507.

Baggaley, M., Noehren, B., Clasey, J., Shapiro, R., Pohl, M.B. (2015). Frontal Plane Kinematics of the Hip During Running: Are They Related to Hip Anatomy and Strength. *Gait and Posture*, 42, 505-510.

Conference Presentations/Published Abstracts

Baggaley, M., Derrick, T.R., Edwards, W.B. (2022). Sensitivity of Internal Tibial Forces and Moments to Static Optimization Joint Moment Constraints at the Foot and Ankle. *North American Congress on Biomechanics*. Canada: Ottawa. (Podium).

Eberts, M., **Baggaley, M.**, Haider, I.T., Morck, D., Hart, D., Schneider, P., Edwards, W.B. (2021). Bone Quality was not Influenced by High-Dose Alendronate Therapy in a Preclinical Model of Osteoporosis. *Alberta Biomedical Engineering Conference*. Canada: Banff. (Podium).

Baggaley, M., Derrick, T.R., Edwards, W.B. (2021). Internal Tibial Forces and Moments During Graded Running. *International Society of Biomechanics*. Virtual Conference. (Podium).

Bruce, O.L., **Baggaley, M.**, Welte, L., Rainbow, M.J., Edwards, W.B. (2021). A Statistical Shape Model of the Tibia-Fibula Complex: Effects of Age on Reconstruction Accuracy From Anatomical Landmarks. *International Society of Biomechanics*. Virtual Conference. (Podium).

Baggaley, M., Edwards, W.B. (2019). The burn ratio: Calories Burned per Contact Force Impulse During Level and Graded Running. *International Society of Biomechanics*. Canada: Calgary. (Podium).

Esposito, M., **Baggaley, M.**, Xu, C., Unnikrishnan, G., Reifman, J., Edwards, W.B. (2019). Effects of Load Carriage on Biomechanical Variables Associated With Tibial Stress Fractures in Running. *International Society of Biomechanics*. Canada: Calgary. (Podium).

Khassaetarash, A., Vernillo, G., **Baggaley, M.**, Horvais, N., Millet, G., Edwards, W.B. (2019). Lower-Extremity Quasi-Stiffness in Graded Running. *International Society of Biomechanics*. Canada: Calgary. (Podium).

Baggaley, M., Vernillo, G, Horvais, N, Millet, G, Edwards, W.B. (2018) The Effect of Grade on Lower

- Extremity Joint Contact Loading During Running. World Congress of Biomechanics. Ireland: Dublin. (Podium)
- Esposito, M, **Baggaley, M.**, Edwards, W.B. (2018). Effects of Load Carriage on Foot-ground Impact and EMG Onset Timing in Running. Undergraduate Research Symposium. Canada: Calgary, AB (Poster)
- Meardon, S.A., Blank, Z., Derrick, T., Willson, J.D., **Baggaley, M**, Willy, R.W. (2017). Relationship between Tibial Bone Stress and Biomechanical Factors associated with Stress Fracture. In proceedings of the American Society of Biomechanics Annual Conference. USA: Boulder, CO. (Poster)
- Baggaley, M**, Edwards, W.B. (2017). Effect of Running Speed on Achilles Tendon Injury Potential: Use of a Weighted Impulse Measure. In Proceedings of the Annual Meeting of the American College of Sports Medicine. USA: Denver, CO (Poster)
- Morrisette, M, Willy, R.W., Blaylock, N, **Baggaley, M**, Meardon, S.A. (2017). Adaptability to Novel Running Conditions following Knee Meniscectomy. American Physical Therapy Association Combined Sections Meeting. USA: San Antonio, TX. (Poster)
- Brafford B.C., Murray N, Willson J.D., Meardon S.A., **Baggaley M**, Willy R.W. (2017) The Effects of an In-Field Gait Retraining Program on Dual Task Performance in Runners with a History of Tibial Stress Injury. American Physical Therapy Association Combined Sections Meeting. USA: San Antonio, TX. (Podium)
- Brown, E, Willy, R.W., Willson, J.D., **Baggaley, M**, Jenkins, W.L., Bartol, K, Meardon, S.A. (2017). Relationship of Running Related Tibial Stress to Foot Mobility and Frontal Plane Tibial Alignment. American Physical Therapy Association Combined Sections Meeting. USA: San Antonio, TX. (Podium)
- Baggaley, M**, Vernillo, G, Horvais, N, Millet, G, Edwards W.B. (2016). Step Length and Energy Absorption at the Knee During Running: Effects of Grade. In Proceedings of Alberta Biomedical Engineering Conference. Canada: Banff, AB. (Poster)
- Meardon, S.A., Willson J.D., Derrick T, **Baggaley, M**, Willy R.W. (2016). Sex Differences in Distal Tibia Bone Stress During Running. In proceedings of the American Society of Biomechanics Annual Conference. USA: Raleigh, NC. (Poster)
- Niland, S., Murraray, N., **Baggaley, M.**, Meardon, S.A., Willson, J.D., Willy, R.W. (2016). Cognitive Performance during a gait retraining program to address running mechanics associated with tibial stress injuries. Research and Creative Achievement Week. USA: Greenville, NC. (Poster)
- Baggaley, M.**, Willy, R.W., Meardon, S.A. (2016). Effect of Fore-foot Striking on Tibial Bone Stress During Running. Human Movement Science and Biomechanics Research Conference. USA: Chapel Hill, NC (Podium)
- Meardon S.A., Stubbs L, Derrick T, Willson J.D., **Baggaley M**, Willy R.W. (2016). Comparison of Running Gait Modifications on Tibial Stress. American Physical Therapy Association Combined Sections Meeting. USA: Anaheim, CA. (Poster)
- Brown E.J., Willy R.W., **Baggaley M.**, Willson J.D., Jenkins W.L., Meardon S.A. (2016). Relationship between Navicular Drop, Tibial Mechanical Axis and Tibial Stress Injury Related Running Mechanics.

American Physical Therapy Association Combined Sections Meeting. USA: Anaheim, CA. (Poster)

Capehart, S., **Baggaley, M.**, Pohl, M.B. (2015). The Effect of Hip Abductor Fatigue on Frontal Plane Kinematics During Walking and Running. In Proceedings of the American Society of Biomechanics Annual Conference. USA: Columbus, OH (Poster)

Brown, E., Willy R.W., **Baggaley, M.**, Meardon S.A. (2015). Navicular Drop and Tibial Mechanical Axis: Relationship with Running Mechanics Associated with Tibial Stress Fracture. Research and Creative Achievement Week. USA: Greenville, NC (Poster)

Baggaley, M., Noehren, B., Clasey, J., Pohl, M.B. (2015). The Relationship between Hip Structure, Hip Strength, and Frontal Plane Kinematics During Running. In Proceedings of the Annual Meeting of the American College of Sports Medicine. USA: San Diego, CA (Thematic Poster)

Baggaley, M., Willy, R.W., Meardon, S.A. (2015). A Comparison of Multi-Variable Real-time Feedback on Impact Forces During Running. Human Movement Science and Biomechanics Research Conference. USA: Chapel Hill, NC (Poster)

Baggaley, M., Pohl, M.B., (2014). Comparing Foot Kinematics Between Males and Females: A Multi-Segment Foot Model Approach. In Proceedings of the Annual Meeting of the American College of Sports Medicine. USA: Orlando, FL (Podium)

Pohl, M.B., **Baggaley, M.**, Noehren. B. (2013). Are Abnormal Proximal Biomechanics Found in Patellofemoral Pain Patients During Running Also Evident During Walking? In Proceedings of the 3rd Annual Patellofemoral Pain Research Retreat. Canada: Vancouver, BC (Poster)

Invited Lectures

Baggaley, M. (2020). Internal Tibial Forces and Moments During Graded Running. Presented at the Human Performance Laboratory Musculoskeletal Biomechanics Seminar, University of Calgary. Canada: Calgary, AB.

Baggaley, M. (2017). Altering Lower Extremity Loading through Step Length Manipulation. Presented at the Human Performance Laboratory Musculoskeletal Biomechanics Seminar, University of Calgary. Canada: Calgary, AB.

Baggaley, M. (2016). Biomechanics of Running. Guest lecture at Indiana University to undergraduate biomechanics students. Indiana University. USA: Bloomington, IN.

Baggaley, M. (2014). Is There a Relationship between Hip Structure, Hip Muscle Strength, and Lower Extremity Frontal Plane Kinematics During Treadmill Running? Presented at the Dept. of Kinesiology and Health Promotion Graduate Student Seminar, University of Kentucky. USA: Lexington, KY.

Industry Reports

Baggaley, M., Edwards, W.B. (2021). Computational modeling of stress-fracture injuries: male and female data. A research report to Henry Jackson Foundation.

Baggaley, M., Edwards, W.B. (2020). Computational modeling of stress-fracture injuries: female data. A research report to Henry Jackson Foundation

SERVICE

Committees

- 2021 Benno Nigg Chair Renewal Committee – Student Advisor
- 2016 – 2018 Event Planning Committee. Human Performance Laboratory. University of Calgary. Calgary, AB.

Student Supervision

Graduate Students

1. Karleen Bartol (DPT Secondary Supervisor), Department of Physical Therapy, East Carolina University, 8/2014-5/2016
2. Zach Blank (DPT Secondary Supervisor), Department of Physical Therapy, East Carolina University, 8/2014-5/2016
3. Emily Brown (DPT Secondary Supervisor), Department of Physical Therapy, East Carolina University, 8/2014-5/2016

Undergraduate Students

1. Mackenzie Eberts, Faculty of Kinesiology, University of Calgary, 5/2021 – 9/2020
2. Owen Steele, Markin USRP, Faculty of Kinesiology, University of Calgary, 1/2020 – 4/2020
3. Michael Esposito, PURE, Faculty of Kinesiology, University of Calgary, 5/2017 – 8/2018
4. James Mather, Markin USRP, Faculty of Kinesiology, University of Calgary, 10/2016 - 5/2017

Ad Hoc Manuscript Reviewer

European Journal of Sports Science
Journal of Sports Sciences
Medicine and Science in Sports and Exercise
Physiotherapy and Practice
Physical Therapy in Sport
Sports Biomechanics
PLOSone
Gait and Posture
Journal of Applied Biomechanics
Journal of Biomechanics
Sports Medicine Open

Miscellaneous Service

- 2022 – Organizer and moderator for the Human Performance Laboratory biomechanics seminar. University of Calgary. Calgary, AB.
- 2018 – 2019 Graduate Student Coordinator. Human Performance Laboratory. University of Calgary. Calgary, AB.
- 2016 Lead Organizer – National Biomechanics Day 2016. East Carolina University. Department of Physical Therapy. Greenville, NC.
- 2015 Judge – Research and Creative Achievement Week 2015. East Carolina University. Greenville, NC.

PROFESSIONAL ACTIVITIES

- 2022 – Member of the Canadian Society of Biomechanics
- 2021 – Member of the International Society of Biomechanics
- 2014 – 2015 Member of the American College of Sports Medicine