

# Ross H. Miller

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## Education

- 2010–2012 **Postdoctoral Training** in Mechanical Engineering, Queen's University  
Advisor: Kevin J. Deluzio  
Program: *Bone and joint health technologies*
- 2006–2010 **Doctor of Philosophy** in Kinesiology, University of Massachusetts  
Advisor: Graham E. Caldwell  
Dissertation: *Optimal control of human running*
- 2004–2006 **Master of Science** in Exercise & Sport Science, Iowa State University  
Advisor: Jason C. Gillette  
Thesis: *Lower extremity mechanics of iliotibial band syndrome during an exhaustive run*
- 2003–2005 **Master of Science** in Mechanical Engineering, Iowa State University  
Advisor: Francine Battaglia  
Thesis: *A numerical analysis of hemodynamics for arterial medical procedures*
- 1999–2003 **Bachelor of Science** in Mechanical Engineering, Iowa State University

## Professional History

- 2012–pres **University of Maryland (College Park, MD)**  
Assistant Professor, Department of Kinesiology, 2012–pres
- 2010–2012 **Queen's University (Kingston, ON)**  
Research Associate, C-Motion Inc., 2011–2012  
Postdoctoral Fellow, Department of Mechanical & Materials Engineering, 2010–2012
- 2006–2010 **University of Massachusetts (Amherst, MA)**  
Graduate Assistant, Department of Kinesiology, 2006–2010
- 2003–2006 **Iowa State University (Ames, IA)**  
Graduate Assistant, Department of Health & Human Performance, 2005–2006  
Graduate Assistant, Department of Mechanical Engineering, 2003–2005

## Scholarship

### *Journal Publications*

Russell EM, **Miller RH**, Umberger BR, and Hamill J (2012). Lateral wedges alter mediolateral load distributions at the knee joint in obese individuals. *Journal of Orthopaedic Research*, accepted.

Gillette JC, Stevermer CA, **Miller RH**, Edwards WB, and Schwab CV (2012). Lower extremity joint moments during carrying tasks in children. *Journal of Applied Biomechanics* **28**, 156–164.

**Miller RH**, Umberger BR, and Caldwell GE (2012). Sensitivity of maximum sprinting speed to characteristic parameters of the muscle force-velocity relationship. *Journal of Biomechanics* **45**, 1406–1413.

**Miller RH**, Umberger BR, and Caldwell GE (2012). Limitations to maximum sprinting speed imposed by muscle mechanical properties. *Journal of Biomechanics* **45**, 1092–1097 [**RHM: ASB Young Scientist Pre-Doctoral Award**].

**Miller RH**, Umberger BR, Hamill J, and Caldwell GE (2012). Evaluation of the minimum energy hypothesis and other potential optimality criteria for human running. *Proceedings of the Royal Society on London B: Biological Sciences* **279**, 1498–1505.

John D, **Miller RH**, Kozey-Keadle SL, Caldwell GE, and Freedson PS (2012). Biomechanical examination of the plateau phenomenon in ActiGraph vertical activity counts. *Physiological Measurement* **33**, 219–230.

**Miller RH** and Caldwell GE (2011). Practical lessons on running and jumping from computer simulations. *Track & Cross Country Journal* **1**, 38–48 [invited review; not peer reviewed].

Hasson CJ, **Miller RH**, and Caldwell GE (2011). Contractile and elastic ankle joint muscular properties in young and older adults. *PLoS ONE* **6**, e15953.

Hamill J, Russell EM, Gruber AH, and **Miller RH** (2011). Impact characteristics in shod and barefoot running. *Footwear Science* **3**, 33–40.

**Miller RH**, Chang R, Baird JL, Van Emmerik REA, and Hamill J (2010). Variability in kinematic coupling assessed by vector coding and continuous relative phase. *Journal of Biomechanics* **43**, 2554–2560.

Gillette JC, Stevermer CA, **Miller RH**, Meardon SA, and Schwab CV (2010). The effects of age and type of carrying task on lower extremity kinematics. *Ergonomics* **53**, 355–364.

Hamill J, Russell EM, Gruber AH, **Miller RH**, and O'Connor KM (2009). Extrinsic foot muscle forces when running in varus, valgus and neutral shoes. *Footwear Science* **1**, 153–161.

**Miller RH**, Caldwell GE, Van Emmerik REA, Umberger BR, and Hamill J (2009). Ground reaction forces and lower extremity kinematics when running with suppressed arm swing. *Journal of Biomechanical Engineering* **131**, 124502.

**Miller RH** and Hamill J (2009). Computer simulation of the effects of shoe cushioning on internal and external loading during running impacts. *Computer Methods in Biomechanics & Biomedical Engineering* **12**, 481–490.

**Miller RH**, Gillette JC, Derrick TR, and Caldwell GE (2009). Muscle forces during running predicted by gradient-based and random search static optimisation algorithms. *Computer Methods in Biomechanics & Biomedical Engineering* **12**, 217–225.

Hamill J, **Miller RH**, Noehren B, and Davis IS (2008). A prospective study of iliotibial band strain in runners. *Clinical Biomechanics* **23**, 1018–1025.

**Miller RH**, Meardon SA, Derrick TR, and Gillette JC (2008). Continuous relative phase variability during an exhaustive run in runners with a history of iliotibial band syndrome. *Journal of Applied Biomechanics* **24**, 262–270.

**Miller RH**, Lowry JL, Meardon SA, and Gillette JC (2007). Lower extremity mechanics of iliotibial band syndrome during an exhaustive run. *Gait & Posture* **26**, 407–413.

### Conference Abstracts, Proceedings, & Papers

**Miller RH**, Edwards WB, Morton AM, and Deluzio KJ (2013). Why don't runners get knee osteoarthritis? Peak and cumulative joint loads in human gait. *American College of Sports Medicine 60th Annual Meeting*, Indianapolis, IN, May 29–June 1, 2013 [invited Featured Science Session].

Gruber AH, Umberger BR, **Miller RH**, and Hamill J (2013). The relationship between achilles tendon moment arm length and rate of oxygen consumption in natural rearfoot and forefoot runners. *American College of Sports Medicine 60th Annual Meeting*, Indianapolis, IN, May 29–June 1, 2013.

**Miller RH** (2012). Why do humans walk the way we do? Evidence from dynamic simulations. *American Society of Biomechanics 36th Annual Meeting*, Gainesville, FL, August 15–18, 2012.

**Miller RH**, Brandon SCE, and Deluzio KJ (2012). Discriminating between knee osteoarthritis severity levels in walking using only force platform data. *American Society of Biomechanics 36th Annual Meeting*, Gainesville, FL, August 15–18, 2012.

Brandon SCE, **Miller RH**, Thelen DG, and Deluzio KJ (2012). Knee osteoarthritis subjects activate muscles to unload medial condyle. *17th Biennial Conference of the Canadian Society for Biomechanics*, Burnaby, BC, June 6–9, 2012.

**Miller RH**, Brandon SCE, and Deluzio KJ (2012). Predicting sagittal plane kinematics that minimize the knee joint contact force. *17th Biennial Conference of the Canadian Society for Biomechanics*, Burnaby, BC, June 6–9, 2012.

**Miller RH** and Caldwell GE (2012). Antagonism and the metabolic cost of simulated human locomotion. *17th Biennial Conference of the Canadian Society for Biomechanics*, Burnaby, BC, June 6–9, 2012.

**Miller RH** and Deluzio KJ (2012). Muscle mechanical properties should be considered when predicting knee joint loading with static optimization. *17th Biennial Conference of the Canadian Society for Biomechanics*, Burnaby, BC, June 6–9, 2012.

John D, **Miller RH**, Kozey-Keadle SL, Caldwell GE, and Freedson PS (2012). Why do ActiGraph vertical activity counts level off? A new perspective. *American College of Sports Medicine 59th Annual Meeting*, San Francisco, CA, May 29–June 2, 2012.

**Miller RH** and Deluzio KJ (2011). Are running and sprinting different gait modes? Evidence from forward dynamics simulations. *American Society of Biomechanics 35th Annual Meeting*, Long Beach, CA, August 10–13, 2011.

**Miller RH**, Umberger BR, Kent-Braun JA, and Caldwell GE (2011). Virtual aging of the muscular system and its effects on running biomechanics. *American Society of Biomechanics 35th Annual Meeting*, Long Beach, CA, August 10–13, 2011.

**Miller RH**, Umberger BR, and Caldwell GE (2011). Optimality criteria for human running investigated by forward dynamics simulations. *29th International Conference on Biomechanics in Sports*, Porto, Portugal, June 27–July 1, 2011.

**Miller RH**, Umberger BR, and Caldwell GE (2010). Theoretical analysis of limitations to maximum sprinting speed imposed by muscle mechanical properties. *American Society of Biomechanics 34th Annual Meeting*, Providence, RI, August 18–21, 2010 [**RHM: ASB Young Scientist Pre-Doctoral Award**].

Hamill J, Gruber AH, Russell EM, **Miller RH**, and Van Emmerik REA (2010). Does changing footfall pattern alter running performance? *6th World Congress on Biomechanics, Singapore*, August 1–6, 2010.

Gruber AH, **Miller RH**, Van Emmerik REA, and Hamill J (2010). Does running speed alter lower extremity segment coordination? *6th World Congress on Biomechanics, Singapore*, August 1–6, 2010.

**Miller RH** and Caldwell GE (2010). The effect of antagonism on the calculation of muscle model parameters. *16th Biennial Conference of the Canadian Society for Biomechanics*, Kingston, ON, June 9–12, 2010.

**Miller RH**, Umberger BR, and Caldwell GE (2010). Effects of history dependence on the mechanics and energetics of the Hill muscle model. *American College of Sports Medicine 57th Annual Meeting*, Baltimore, MD, June 2–5, 2010 [**RHM: ACSM Biomechanics Interest Group Student Research Award**].

Gruber AH, **Miller RH**, Russell EM, Van Emmerik REA, and Hamill J (2010). Alterations in joint kinematics and ground reaction forces with running speed. *American College of Sports Medicine 57th Annual Meeting*, Baltimore, MD, June 2–5, 2010.

Russell EM, **Miller RH**, and Hamill J (2010). Walking with obesity: differences in muscle function. *American College of Sports Medicine 57th Annual Meeting, Baltimore, MD, June 2–5, 2010* [EMR: ACSM Biomechanics Interest Group Student Research Award].

**Miller RH**, Russell EM, Gruber AH, and Hamill J (2009). Foot-strike pattern selection to minimize muscle energy expenditure during running: a computer simulation study. *American Society of Biomechanics 33rd Annual Meeting, State College, PA, August 26–29, 2009*.

**Miller RH**, Umberger BR, and Caldwell GE (2009). Muscle forces in the lower limb predicted by static and dynamic optimization. *American Society of Biomechanics 33rd Annual Meeting, State College, PA, August 26–29, 2009*.

Gillette JC, Stevermer CA, **Miller RH**, Edwards WB, and Schwab CV (2009). Lower extremity joint moments during carrying tasks in children. *American Society of Biomechanics 33rd Annual Meeting, State College, PA, August 26–29, 2009*.

Gruber AH, Russell EM, **Miller RH**, Chang R, and Hamill J (2009). Segment coordination response to alterations in foot strike pattern. *American Society of Biomechanics 33rd Annual Meeting, State College, PA, August 26–29, 2009*.

Hasson CJ, **Miller RH**, Foulis SA, Kent-Braun JA, and Caldwell GE (2009). Application of musculoskeletal models to aging: obtaining subject-specific measures of muscle volume using MRI. *American Society of Biomechanics 33rd Annual Meeting, State College, PA, August 26–29, 2009*.

Russell EM, Gruber AH, **Miller RH**, O'Connor KM, Van Emmerik REA, and Hamill J (2009). Wedged footwear perturbations affect lower extremity coordination dynamics. *27th International Conference on Biomechanics in Sports, Limerick, Ireland, August 17–21, 2009*.

Van Emmerik REA, **Miller RH**, and Hamill J (2009). Dynamical systems approach to movement coordination. *27th International Conference on Biomechanics in Sports, Limerick, Ireland, August 17–21, 2009*.

Hamill J, Russell EM, Gruber AH, **Miller RH**, and O'Connor KM (2009). Extrinsic foot muscle forces when running in varus, valgus and neutral shoes. *9th Biennial Footwear Biomechanics Symposium, Stellenbosch, South Africa, July 10–12, 2009*.

Hamill J, **Miller RH**, Gruber AH, and Russell EM (2009). Extrinsic foot muscle forces during running with different footfall patterns. *22nd Congress of the International Society of Biomechanics, Cape Town, South Africa, July 5–9, 2009*.

**Miller RH**, Umberger BR, Hamill J, and Caldwell GE (2009). Dynamic optimization of maximum-effort human sprinting. *American Society of Mechanical Engineers Summer Bioengineering Conference, Lake Tahoe, CA, June 17–21, 2009*.

Hamill J, **Miller RH**, Noehren B, and Davis IS (2008). A prospective study on iliotibial band syndrome. *11th Annual International Conference on Foot Biomechanics & Orthotic Therapy, Vancouver, BC, October 24–26, 2008*.

**Miller RH**, Caldwell GE, and Kent-Braun JA (2008). Fatigue in a Hill-based muscle model of human tibialis anterior. *American Physiological Society Intersociety Meeting: The Integrative Biology of Exercise V, Hilton Head, SC, September 24–27, 2008*.

Edwards WB, Sealine BJ, **Miller RH**, Gillette JC, and Derrick TR (2008). Static optimization of muscle forces during drop landings: a comparison of cost functions. *4th North American Congress on Biomechanics, Ann Arbor, MI, August 5–9, 2008*.

Hasson CJ, **Miller RH**, and Caldwell GE (2008). Determination of subject-specific mechanical properties of individual ankle joint muscles. *4th North American Congress on Biomechanics, Ann Arbor, MI, August 5–9, 2008*.

**Miller RH** and Hamill J (2008). Computer simulation of internal structural loading: application to overuse running injuries. *4th North American Congress on Biomechanics*, Ann Arbor, MI, August 5–9, 2008.

**Miller RH**, Hasson CJ, and Caldwell GE (2008). Subject-specific force-length parameters of the ankle plantarflexors in young adults. *4th North American Congress on Biomechanics*, Ann Arbor, MI, August 5–9, 2008.

**Miller RH**, Caldwell GE, Van Emmerik REA, Hamill J, and Umberger BR (2008). Does restraining arm motion alter ground reaction forces during running? *4th North American Congress on Biomechanics*, Ann Arbor, MI, August 5–9, 2008.

**Miller RH**, Umberger BR, and Caldwell GE (2008). Optimal control solutions for a simple model of human jumping. *American Society of Mechanical Engineers Summer Bioengineering Conference*, Marco Island, FL, June 25–29, 2008.

Gillette JC, Stevermer CA, **Miller RH**, and Schwab CV (2008). Effects of asymmetric carrying tasks on lower extremity kinematics in farm children. *National Institute for Farm Safety International Meeting*, Lancaster, PA, June 22–26, 2008.

Russell EM, **Miller RH**, and Hamill J (2008). Stride length influences knee joint moments and contact forces during walking in obese women. *American College of Sports Medicine 55th Annual Meeting*, Indianapolis, IN, May 28–31, 2008 [[EMR: ACSM Biomechanics Interest Group Student Research Award](#)].

Hamill J, **Miller RH**, Noehren B, and Davis IS (2007). Strain in the iliotibial band: a cause of injury? *44th Annual Technical Meeting of the Society of Engineering Science*, College Station, TX, October 21–24, 2007.

Hamill J, **Miller RH**, Noehren B, and Davis IS (2007). A strain model of the iliotibial band. *25th International Conference on Biomechanics in Sports*, Ouro Preto, Brazil, August 23–27, 2007.

**Miller RH**, Caldwell GE, and Derrick TR (2007). Determining vertical ground reaction forces without a force platform using a mass-spring-damper model. *American Society of Biomechanics 31st Annual Meeting*, Palo Alto, CA, August 22–25, 2007.

**Miller RH**, Gillette JC, and Derrick TR (2007). Sensitivity of muscle force predictions during over-ground running to choice of optimization algorithm. *American College of Sports Medicine 54th Annual Meeting*, New Orleans, LA, May 31–June 3, 2007.

Meardon SA, **Miller RH**, Derrick TR, and Gillette JC (2006). Lower extremity coupling variability during an exhaustive run in individuals with iliotibial band syndrome. *American Society of Biomechanics 30th Annual Meeting*, Blacksburg, VA, September 6–9, 2006.

**Miller RH** and Battaglia F (2006). A novel computational approach for modeling stent reconstruction of an aortic bifurcation. *American Society of Mechanical Engineers Joint US-European Fluids Engineering Division Summer Meeting*, Miami, FL, July 17–20, 2006.

Meardon SA, Gillette JC, Stevermer CA, **Miller RH**, Derrick TR, Schwab CV, and Freeman SA (2006). Age and condition related differences during carrying tasks in farm youth. *American College of Sports Medicine 53rd Annual Meeting*, Denver, CO, May 30–June 2, 2006.

**Miller RH**, Lowry JL, and Gillette JC (2006). Prediction of iliotibial band strain during running. *American College of Sports Medicine 53rd Annual Meeting*, Denver, CO, May 30–June 2, 2006.

**Miller RH**, Battaglia F, and Olsen MG (2005). A computational and experimental investigation of flow in an intracranial side-wall aneurysm. *American Society of Mechanical Engineers Fluids Engineering Division Summer Meeting*, Houston, TX, June 19–23, 2005.

### Invited Presentations

**Miller RH** (2012). Gait biomechanics and the prevention of knee osteoarthritis. *9th Annual Orthopaedic Care Conference*, Kingston, ON, October 26, 2012.

**Miller RH** (2012). New questions on the mechanics, energetics, and motor control of human walking. *University of Maryland*, College Park, MD, March 26, 2012.

**Miller RH** (2012). Curiosity and clinically motivated questions on the biomechanics of human walking. *University of Massachusetts Amherst*, Amherst, MA, February 15, 2012.

**Miller RH** (2011). Optimality criteria for predictive simulations of human running. *Queen's University*, Kingston, ON, February 9, 2011.

**Miller RH** (2010). Computer simulation of human running. *Mount Holyoke College*, Holyoke, MA, April 12, 2010.

### Book Chapters

Van Emmerik REA, **Miller RH**, and Hamill J (2012). Dynamical systems methods for the analysis of movement coordination. In: Robertson DGE, Caldwell GE, Hamill J, Kamen G, and Whittlesey SN (eds.), *Research Methods in Biomechanics* 2nd Ed. Champaign: Human Kinetics.

Hamill J, Gruber AH, and **Miller RH** (2012). Footwear effects on running kinematics. In: Goonetilleke RV (ed.), *The Science of Footwear*. Boca Raton: CRC Press.

### Grantsmanship

*Statistical models for establishing a control data set for biomechanical gait analysis* (2012). Natural Sciences & Engineering Research Council of Canada (EGP 437693-12). Funding: CAD\$25,000 over six months. Role: co-investigator. Status: active.

*Integrating OpenSim with high-performance computing to predict optimal walking gaits* (2012). National Center for Simulation in Rehabilitation Research (Visiting Scholars Program). Funding: \$1,500 over one week. Role: principal investigator. Status: declined (unable to make travel dates).

*Neuromuscular contribution to contact forces in knee osteoarthritis subjects* (2011). National Center for Simulation in Rehabilitation Research (Pilot Projects Program) Funding: \$5,000 over one year. Role: co-investigator. Status: completed.

*Insights into human running through computer simulations* (2008). University of Massachusetts Amherst (Graduate School Fellowship) Funding: \$12,500 over one year. Role: principal investigator. Status: completed.

*A subject-specific musculoskeletal model of the iliotibial tract* (2007). American Society of Biomechanics (Graduate Student Grant-In-Aid) Funding: \$863 over one year. Role: principal investigator. Status: completed.

### Service

#### Professional Memberships

2007–pres American Society of Biomechanics  
2004–2011 American Society of Mechanical Engineers

### *Professional Service*

- 2013 Abstract reviewer – American College of Sports Medicine Annual Meeting
- 2012–pres Abstract reviewer – American Society of Biomechanics Annual Meeting
- 2010–pres Associate Editor – *Track & Cross Country Journal*

**Manuscript reviewer** for *European Journal of Applied Physiology*, *Footwear Science*, *Journal of Applied Biomechanics*, *Journal of Biomechanical Engineering*, *Journal of Biomechanics*, *Journal of Foot & Ankle Research*, *Journal of Physiology*, *Journal of Sports Sciences*, *Kinesiology Review*, *Medicine & Science in Sports & Exercise*, *Sports Biomechanics*

### *Service at Maryland*

#### **Department of Kinesiology**

- 2012–pres Member, graduate program and admissions committee

### **Awards & Honors**

- 2010 American Society of Biomechanics – Young Scientist Pre-Doctoral Award
- 2010 American College of Sports Medicine – Biomechanics Interest Group Student Research Award
- 2005 Iowa State University – Teaching Excellence Award
- 2003 Iowa State University – Premium for Academic Excellence
- 2003 Iowa State University – Graduation with Distinction

Ross Henry Miller. Birthdate: April 25, 1900.Â Ross Henry Miller in MyHeritage family trees (Landers Web Site). Ross Henry Miller. Collection: MyHeritage Family Trees. â€¢ affiliation â€¢ search literature database for additional publications. Publications of Ross H. Miller (13 listed): Florida Entomologist (2014) 97, 108-113Gadi V.P. Reddy and Ross H. Miller (2014)Field evaluation of petroleum spray oil and carbaryl against *Tetranychus marianae* (Acari: Tetranychidae) on eggplant. Environmental Entomology (2014) 43, 767-773Gadi V.P. Reddy, Shaohui Wu, Robert C. Mendi and Ross H. Miller (2014)Efficacy of pheromone trapping of the sweetpotato weevil (Coleoptera: Brentidae) Ross H. Miller. Associate Professor of Kinesiology, University of Maryland. Verified email at umd.edu.Â RH Miller, BR Umberger, GE Caldwell. Journal of Biomechanics 45 (6), 1092-1097, 2012. 60. 2012. Selective lateral muscle activation in moderate medial knee osteoarthritis subjects does not unload medial knee condyle. SCE Brandon, RH Miller, DG Thelen, KJ Deluzio. Journal of Biomechanics 47 (6), 1409-1415, 2014. 45. 2014. Ross H. Miller. The effects of four pesticides on populations of the psyllid, *Insnesia glabrascuta* (Caldwell), were examined on ifit trees, *Intsia bijuga* (Colebr.) O. Kuntze.Â Three common crop aphid pests on Guam, *Aphis craccivora* Koch, *Aphis gossypii* Glover, and *Toxoptera citricida* (Kirkaldy) were examined in laboratory dip test bioassays using three commonly used insecticides, dimethoate, diazinon, and malathion. The LD50 ,L D 90, lethal dose ratios and 95% confidence limits were computed for each aphid-insecticide co Ross Miller is an artist who works to integrate art into public places and every day experience. Through landscape integrated artwork he seeks to create community identity in outdoor spaces, create sites for private reflection and cultural expression, and works to amplify one's experience of nature and natural processes.