Curriculum Vitae

Laura M. McPherson, PT, DPT, PhD

Preparation Date: December 3, 2025

Present Position

Nov. 2019 – Assistant Professor of Physical Therapy and Neurology
Faculty, Program in Neurosciences
Affiliate Faculty, Department of Biomedical Engineering
Washington University School of Medicine, St. Louis, MO

Education

2006 B.E., Biomedical Engineering — Vanderbilt University, Nashville, TN
Neuroscience (minor)

2012 D.P.T., Physical Therapy — Northwestern University, Chicago, IL

2014 Ph.D., Biomedical Engineering — Northwestern University, Evanston, IL

Thesis: Miller, LC (2014). Quantification of Abnormal Coupling Between the Paretic Upper Arm and Hand of Individuals with Chronic Hemiparetic Stroke Using Neurophysiological and Biomechanical Measurements (Doctoral dissertation). ProQuest Dissertations and Theses, No. 3669288.

Advisor: Julius P.A. Dewald, PT, PhD

2015 Postdoctoral training, Neurophysiology — Northwestern University, Chicago, IL

Advisor: CJ Heckman, PhD

Academic Positions / Employment

2006 – 2014 Graduate Research Assistant
Department of Physical Therapy and Human Movement Sciences Northwestern University, Chicago, IL

2012 – 2015 Contract Educator
Doctor of Physical Therapy Program
Northwestern University, Chicago, IL

2012 – 2015 Physical Therapist (part-time, inpatient rehabilitation)
Rehabilitation Institute of Chicago/Shirley Ryan Ability Lab, Chicago, IL

2014 – 2015 Research Associate
Department of Physical Therapy and Human Movement Sciences Northwestern University, Chicago, IL

2015 – 2019 Assistant Professor
Department of Physical Therapy (primary, tenure-earning)
Department of Biomedical Engineering (secondary)
Florida International University, Miami, FL

2019 – present Assistant Professor
Program in Physical Therapy, Department of Neurology
Faculty, Program in Neurosciences
Affiliate Faculty, Department of Biomedical Engineering
Washington University School of Medicine
Washington University in St. Louis, St. Louis, MO

2023 – present Courtesy Assistant Professor
The Institute for Integrative and Innovative Research (I^3R)
University of Arkansas
Fayetteville, AR

Teaching Title and Responsibilities

Courses taught:

Northwestern University

Doctor of Physical Therapy Program, Feinberg School of Medicine

Cohorts of 80 – 95 students

2009, 2012	Neuroscience II (Teaching Assistant)
2013 – 2015	DPT Synthesis Research Project (Contract Educator, 5 students/year)
2013 – 2015	Kinesiology I (Contract Educator)
2014 – 2015	Kinesiology II (Contract Educator)
2015	Examination and Evaluation II (Contract Educator)

Florida International University

Doctor of Physical Therapy Program

Cohorts of 55 – 65 students; typically, 50 – 80% of students are underrepresented minorities

2015 – present	DPT Capstone Research Project (Project Advisor, 10-13 students/year)
2016 – 2018	Applied Clinical Neuroanatomy (Lecture and lab coordinator; Instructor for all lectures)
2016	Dimensions of Professional Practice Seminar I (Guest Lecturer)
2016, 2018	Annual Interprofessional Workshop (Faculty Moderator, >500 students)
Spring 2018	Advanced Pathologic Movement Analysis (Co-Instructor)

Biomedical Engineering Program

2015 – 2016	Undergraduate Senior Design Project (Faculty Advisor, 5 students)
2017 – 2018	Undergraduate Senior Design Project (Project Co-Sponsor, 4 students)
Fall 2018	Applied Clinical Neuroanatomy for MS in BME, PhD in BME, and Orthotics and Prosthetics students (Instructor for all lectures, 9 students)

Washington University

Program in Physical Therapy

DPT curriculum:

Fall 2020	Neuroscience (2 guest lectures)
Spring 2021	DEA III (1 discussion session)
2021 – present	Module 1 (Use of pre-recorded materials related to Neuroscience)
2024 – present	Module 7/8, Journal Club lead for ~30 students
2024 – present	Faculty coach for small group of student learners

Movement Science Program PhD curriculum:

Apr. 2020, 2024	Program Seminar (Led 1 discussion session)
Fall 2020	Biocontrol of Movement (2 lectures, 1 discussion session)
Spring 2022	Program Seminar (1 discussion session)
Fall 2022	Biocontrol of Movement (2 lectures (via pre-recorded video modules), 1 in-person discussion session)
Fall 2024	Biocontrol of Movement (Course Director)

University, School of Medicine and Hospital Appointments and Committees

Florida International University

Intercollegiate

Fall 2015	Judge, Senior Design Competition, Department of Biomedical Engineering
2015 – 2016	Co-Chair, DPT/PhD in Biomedical Engineering Combined Degree Program Committee, Departments of Physical Therapy and Biomedical Engineering

Nicole Wertheim College of Nursing and Health Sciences

2016 – 2018	Member, Technology Committee
2017 – 2019	Member, Dissertation Advisory Status and Graduate Faculty Status Committee
2018 – 2019	Member, Research Council
2018 – 2019	Member, Curriculum Committee

Department of Physical Therapy

2018 – 2019	Member, Committee for Promotion of Student Professional and Affective Behaviors
2017 – 2019	Co-chair, Media and Public Relations Committee
2015 – 2019	Member, Admissions Committee
2015 – 2019	Member, Curriculum Committee
2015 – 2019	Member, Research Committee

Washington University

Program in Physical Therapy

2019 – present	Research Advisory Committee, member
2020 – present	Curriculum Renewal Committee, Pharmacology Thread co-leader
2020 – present	Physical Therapy MSP PhD program applicant reviewer

School of Medicine

2024, 2025	Grant reviewer for the Institute of Clinical and Translational Sciences Clinical and Translational Research Funding Program (CTRFP)
2025	Grant reviewer for the Institute of Clinical and Translational Sciences KL2 Career Development Award

Medical Licensure and Certification

2012 –	Illinois Physical Therapist License #070019408

Honors and Awards

2006	Arnold Palmer Senior Design Project Prize, Finalist

	Department of Biomedical Engineering, Vanderbilt University
2009	United States Naval Research Laboratory Student Travel Fellowship, Robotics: Science and Systems Conference Workshop, Seattle, WA
2012	Northwestern University Graduate School Conference Travel Grant
2012	Dean of Feinberg School of Medicine DPT/PhD Scholar Award Feinberg School of Medicine, Northwestern University
2013	Mary Lou Barnes Award, Outstanding Promotion of Doctoral Studies II Scholarship Application in Neurology, Foundation for Physical Therapy
2012 – 2014	NIH T32 Pre-doctoral Trainee, Interdisciplinary Graduate Education in Movement & Rehabilitation Sciences
2013 – 2014	Senior Graduate Student, Department of Physical Therapy and Human Movement Sciences, Northwestern University
2014	Outstanding Student Presentation Award 9th International Motoneuron Meeting, Halifax, Canada
2014	International Finalist, Student Paper Competition International Conference of the IEEE Engineering in Medicine and Biology Society
2015	Early Career Professional Award American Physical Therapy Association Academy of Neurology
2016	Traveling Fellows Award American Physical Therapy Association Section on Research
2017	Young Alumnus of the Year Northwestern University Physical Therapy Alumni Association
2018	Best Podium Presentation by an Assistant Professor 11th International Motoneuron Meeting, Boulder, CO
2024	Selected as a Top 50 Abstract (out of 568 accepted) Association for Clinical and Translational Science Annual Meeting

Editorial Responsibilities

Topic editor: *Frontiers in Sports and Active Living* (2023): "Chronic adaptations and acute adjustments in the behavior of the neuromusculoskeletal system in health and pathology"

Co-guest editor: *Journal of Electromyography and Kinesiology* Special Issue (2020): "International Motoneuron Society: from motor unit discharge to motor control"

Manuscript reviewer for: *Journal of Neurophysiology, Clinical Neurophysiology, Journal of Biomechanics, Experimental Brain Research, Journal of Neural Engineering, Gait and Posture, Annals of Biomedical Engineering, Journal of Electromyography and Kinesiology, Journal of Back and Musculoskeletal Rehabilitation, PLOS One, Neurorehabilitation and Neural Repair, Journal of Physiology*

Conference abstract reviewer for:

American Physical Therapy Association Combined Sections Meeting, Academy of Physical Therapy Education and Academy of Neurology; IEEE Engineering in Medicine and Biology Society

National Panels, Committees, Boards

2016 – 2019 Member, Research Committee, Academy for Physical Therapy Education, American Physical Therapy Association

2017 – 2020 Member, Frontiers in Rehabilitation, Science, and Technology (FiRST) Council, Sensing and Robotics Workgroup, American Physical Therapy Association

2024 – 2026 Invited Member, American Heart Association Writing Group

2024 – 2026 Invited Member, Stroke Rehabilitation and Recovery Committee of the Stroke Council, American Heart Association

2025 – 2026 Invited Member, Stroke Rehabilitation and Recovery Peer Review Committee, American Heart Association

Community Service Contributions

Professional Societies and Organizations

2008 – present Society for Neuroscience
2012 – present American Physical Therapy Association
2014 – present International Motoneuron Society
2015 – 2019 Florida Physical Therapy Association
2016 – present Society for the Neural Control of Movement
2017 – present International Society of Motor Control
2019 – present Missouri Physical Therapy Association
2024 – present American Heart Association

K-12 Outreach

2025 Career Day presenter, Mallinckrodt Academy of Gifted Instruction. St. Louis, MO. Presented an overview of my career (research, teaching, patient care) to individual grade levels from pre-Kindergarten through fifth grade. Tailored presentation and discussion to the needs of each grade level.

Major Invited Professorships and Lectureships

1. "Quantification of the flexion and extension synergies at the hand in chronic hemiparetic stroke." Second Annual Movement and Rehabilitation Sciences Training Day, Northwestern University, Chicago; September 7, 2012.
2. "Motor unit firing patterns during abnormal multi-joint coupling in chronic hemiparetic stroke." Fourth Annual Movement and Rehabilitation Sciences Training Day, Northwestern University, Chicago August 22, 2014.
3. "Towards improved patient function: how basic science and advanced technologies can inform rehabilitation." Florida International University Nicole Wertheim College of Nursing and Health Sciences Seminar Series, Miami, FL; January 27, 2015.
4. "Introduction to clinical research for physical therapists," Memorial West Hospital, Pembroke Pines, FL; December 1, 2015.

5. "Motor unit coherence among muscles of the flexion synergy in individuals with chronic hemiparetic stroke." Society for Neuroscience Pre-Conference Meeting on Rhythmic Motor Circuits, Chicago; October 16, 2015.
6. "Biomarkers, genetics, motor units, and robotics: the future of neurorehabilitation," Stroke Rehabilitation: Promoting Recovery Across the Continuum of Care. Florida International University Nicole Wertheim College of Nursing and Health Sciences/West Gables Hospital 3rd Annual Stroke Symposium, Miami, FL; May 14, 2016.
7. "Evidence for altered sensorimotor integration after stroke: analysis of motor unit behavior." Annual Society for Brain Mapping and Therapeutics World Congress, Miami, FL; April 9th, 2016.
8. Invited presenter and panelist. "Women in Research Panel and Dinner," Society for Women Engineers, Florida International University Chapter. November 17th, 2017.
9. "Toward improved patient function: Elucidating central nervous system pathophysiology by decoding motor unit population discharge." University of Florida Rehabilitation Sciences Seminar Series. Gainesville, FL; January 16, 2018.
10. "Distribution of neuromodulatory inputs among upper limb muscles." 11th International Motoneuron Meeting, Boulder, CO. June 11, 2018.
11. "From motor units to motor impairments: guiding targeted rehabilitation interventions." Washington University in St. Louis Program in Physical Therapy. St. Louis, MO; January 14, 2019.
12. "90% of the game is half mental: the neuromechanics of baseball." Thirst for Science community engagement event. Miami, FL; March 21, 2019.
13. "High-density EMG neuro-biomarkers for improving rehabilitation therapies." Rehab Week Workshop, Toronto, CA. June 24, 2019.
14. "Pathological inhibition post-stroke may limit motor unit rate modulation during voluntary contractions in a muscle-dependent manner." National Center of Neuromodulation for Rehabilitation Operant Conditioning Special Interest Group meeting. Virtual. April 29, 2021.
15. "Changes in excitatory synaptic input alone are insufficient to explain disruptions in motor unit rate modulation post-stroke." Motor Unit Group Seminar Series, hosted by the International Motoneuron Meeting. Virtual. July 19, 2021
16. "Pathophysiology of voluntary motor commands in patients with multiple sclerosis identified using reverse engineering of motor unit population discharge." International Society for Electromyography and Kinesiology Around the World Event. Virtual. October 26, 2023.
17. "Characterizing voluntary motor commands at the level of the spinal motoneuron to inform novel, mechanistically based interventions for people with neurological injury." Washington University Program in Physical Therapy Seminar Series. March 5, 2024.
18. "Pathophysiology of voluntary motor commands in people with multiple sclerosis." Society for Neuroscience Motor Systems Pre-Conference Symposium. October 4, 2024.
19. "Transitioning from Translational Research to Science: Real-World Examples." Invited panelist. 7th Annual Institute for Clinical and Translational Sciences Symposium, Washington University in St. Louis. May 7, 2025.

20. "My career path as a DPT/PhD dual-degree graduate." Seminar and discussion to students of the Northwestern University DPT/PhD in Engineering dual-degree program. December 2, 2025.

Research Support

Governmental (past):

H133G070089 (PI: Julius Dewald) 2007 – 2011
NIDILRR $586,576 (TC)
Overcoming Gravity Induced Arm and Hand Dysfunction to Restore Functional Reaching Following Stroke
Role: Graduate Research Assistant

T32 EB009406 (PI: Julius Dewald) 2012 – 2014
NIH/NICHD/NIBIB $520,284 (DC)
Interdisciplinary Graduate Education in Movement and Rehabilitation Sciences
Role: Pre-doctoral trainee

R01 HD039343 (PI: Julius Dewald) 2013 – 2018
NIH/NICHD $1,130,019 (DC)
Effect of Neural Constraints on Movement in Stroke
Roles: Graduate Research Assistant (2013 – 2014); Research Associate (2015); Subaward PI (2016 – 2018)

KL2 2022 – 2024
NIH CTSA, Institute of Clinical and Translational Sciences, Washington University
Neural mechanisms of motor heterogeneity in multiple sclerosis $200,000 (TC)
Role: PI

R01 EB027584 (PIs: Ranu Jung, James Abbas) 2018 – 2024
NIH/NIBIB $763,755 (TC)
CRCNS: Improving Bioelectronic Selectivity with Intrafascicular Stimulation
Role: Co-Investigator (PI of Subaward to Washington University)

Governmental (current):

DOD CDMRP Multiple Sclerosis Research Program 2024 – 2026
Exploration Hypothesis-Generation Award $250,000 (TC)
Subclinical pathophysiology of motor processing in people with multiple sclerosis
Role: PI

R01NS125863-01A1 2022 – 2027
NIH/NINDS $3,907,537 (TC)
Supercomputer-based Models of Motoneurons for Estimating Their Synaptic Inputs in Humans
Role: Co-Investigator (PI of Subaward to Washington University)

Non-governmental (past):

Foundation for Physical Therapy 2012 – 2013
Promotion of Doctoral Studies II Scholarship $15,000 (DC)
Neural Coupling Between the Paretic Shoulder and Hand in Chronic Hemiparetic Stroke
Role: Principal Investigator (as Laura C. Miller)

American Physical Therapy Association 2016
Section on Research Traveling Fellows Award $2000 (DC)
Role: Principal Investigator

Coulter Foundation SEED Grant 2018 – 2019
(PIs: Laura McPherson, Jacob McPherson, Zachary Danziger) $60,000 (DC)
Non-invasive Decoding of Neuromuscular Activity for Rehabilitation and Prosthetic Control
Role: Co-Principal Investigator

American Heart Association (PI: Jacob McPherson) 2019 – 2021
Innovative Project Award $181,818 (DC)
Restorative Neuroplasticity in Brainstem Motor Pathways to Enhance Rehabilitation Post-Stroke
Role: Co-Investigator

McDonnell Center for Systems Neuroscience 2020 – 2024
Washington University
Small Grants Program $80,000 (DC)
Factors influencing the detection of accurate and reliable motor unit population recordings in humans
Role: Principal Investigator

Third year continuation of NIH-funded KL2 award 2024 – 2025
Institute of Clinical and Translational Sciences (ICTS) and Program in
Physical Therapy, Washington University
Neural mechanisms of motor heterogeneity in multiple sclerosis $125,275 (DC)
Role: Principal Investigator

Washington University ICTS 2024 – 2025
Clinical and Translational Research Funding Program $50,000 (DC)
Subclinical pathophysiology of voluntary motor processing in people with multiple sclerosis
Role: Principal Investigator

Non-governmental (current):

Washington University ICTS 2025 – 2026
Clinical and Translational Research Funding Program Supplement $25,000 (DC)
Voluntary Motor Commands Throughout the Adult Lifespan: Open Dataset and Age/Sex Interactions
Role: Principal Investigator

Parkinson Disease Foundation MacKinnon C (PI) 2025 – 2027
Impact Award $200,000 (TC)
The effects of vagus nerve stimulation on intrinsic lower leg spinal motoneuron excitability in Parkinson's disease
Role: Co-Investigator (PI of subaward)

Longer Life Foundation 2025 – 2026
Developmental Research Award $50,000 (TC)
A novel neurophysiological biomarker for MS disease progression
Role: Principal Investigator

Trainee/Mentee/Sponsorship Record

Staff Scientist

2024 – present Daniel Free, PhD

Post-Doctoral Fellows

2016 – 2017 Nicole Rendos, PhD, LAT, ATC, CSCS
Current position: Assistant Professor, Division of Physical Therapy, Emory School of Medicine, Atlanta, GA.

2017 – 2019 Changki Kim, PhD
Current position: Assistant Professor, Department of Kinesiology, University of Alabama, Tuscaloosa, AL.

2023 Lynn McCane, MS, PhD

Graduate Student Advisement

Spring 2018 Andre Lorenz-Chu, MS (Department of Biomedical Engineering, Florida International University, Professional Track Masters)
Role: Research Mentor

2016 – 2021 Altamash Hassan, BS, Department of Biomedical Engineering, Northwestern University
Role: PhD Dissertation Co-Chair with Jules Dewald, PT, PhD

2022 – 2024 Tanner Reece, BS, MS, Movement Science PhD program, Washington University in St. Louis. Left program after two years to pursue position in industry.
Role: Research Mentor and Dissertation Chair

Doctoral Qualifying Exam Committees

2023 Dakota Kamm, Movement Science PhD Program

2023 Allison Haussler, Movement Science PhD Program

2023 Rachel Hawthorn, Biomedical Engineering PhD Program

2025 Adrian Rivera, Biomedical Engineering PhD Program

Dissertation Committees

2018 – 2023 Anil K. Thota, MS, Department of Biomedical Engineering, Florida International University
Primary Advisor: Ranu Jung, PhD

2021 – 2022 Jessica Barth, MS, OTR/L, Program in Physical Therapy, Movement Science PhD program, Washington University in St. Louis
Primary Advisor: Catherine Lang, PT, PhD

2021 – present Arianna Ortega, Department of Biomedical Engineering, University of Arkansas
Primary Advisor: Ranu Jung, PhD

2025 – present Rachel Hawthorn, Department of Biomedical Engineering, Washington University
Primary Advisor: Ismael Seanez, PhD

Invited External Reviewer of Doctoral Dissertation

July 2022 Morteza Rouhani, School of Mathematical and Statistical Sciences, Arizona State University

Advisors: James Abbas, PhD and Sharon Crook, PhD

April 2023 Chris Taylor, Health Sciences and Rehabilitation Sciences, Temple University
Advisor: Christopher Thompson, DPT, PhD

DPT Students

Northwestern University

2013 – 2015 Scott Heinichen, Megan McLerran, Kelsey Rose, Amanda Winters, Kristen Schulz

Florida International University

Role: Capstone Research Project Advisor

Fall 2015 Leisy Hernandez, Christina Glenn, Emely Carpio, Nandini Rampersaud, Jon Magnuson, Christine Plaza, Jocelyn Cheung, Alixandra Lakow, Michael Tang, Krista Beach

2016 – 2017 Desaly Gonzalez, Marcus Jackovitz, Domenica Caleca, Andrea Reynoso, Hugo Botero, Katie Hutchinson, Austin Win, Victoria Fernandez, Kellie John, Laura Sanchez

2017 – 2018 Ana Espinal, Jorge Carreno, Shyam Zaveri, Pablo Vega, Richard Varghese, Roy Diaz, Monica Gonzalez, Emily Nelson, Anthony Nunez, Jeff Maurer, Michelle Garcia-Casals

2018 – 2019 Erin Venditti, Jessica Stabler, Ashley Wilcock, Rachel Bubbel, Hector Galvez, Sijin Lee, Jemma Lopez, Jessica Lopez, Melissa Lopez, Samantha Noble, Zach Routman, Shana Saffer, Danika St. Louis

Washington University in St. Louis

2021 – 2024 Kiera Olson, BSE

2022 – 2024 Bari Schunicht, BE

2023 – present Krystal Panagiotaros, BS

2024 – present Rui Gong, BS

Undergraduate Students

Florida International University

2018 – 2019 Emily Baragar, Biomedical Engineering Program, pre-medical track

Washington University in St. Louis

2022 – 2023 Anirudh Manika, Biomedical Engineering Program

2023 – 2024 Rin Iimi, Biomedical Engineering Program

2025 – present Shruthi Madhugiri, Biomedical Engineering Program

Summer 2025 Henry Ye, ASPIRE Summer Research Program

Bibliography:

Original, peer reviewed articles in refereed journals:

1. Keller NR, Diedrich A, Appalsamy M, **Miller LC**, Caron MG, McDonald MP, Shelton RC, Blakely RD, *Robertson D. Norepinephrine transporter-deficient mice respond to anxiety producing and fearful environments with bradycardia and hypotension. *Neuroscience*. 2006: 139(3): 931-946. doi.org/10.1016/j.neuroscience.2006.01.008

2. **Miller LC**, Ruiz Torres R, Stienen AHA, *Dewald JPA. A wrist and finger force sensor module for use during movements of the upper limb in chronic hemiparetic stroke. *IEEE Trans Biomed Eng.* 2009: 56(9): 2312-2317. doi: 10.1109/TBME.2009.2026057.

3. Stienen AH, Moulton TS, **Miller LC**, *Dewald JPA. Wrist and Finger Torque Sensor for the quantification of upper limb motor impairments following brain injury. *IEEE Int Conf Rehabil Robot*. 2011; 2011:5975464. doi: 10.1109/ICORR.2011.5975464.

4. **Miller LC**, *Dewald JPA. Involuntary paretic wrist/finger flexion forces and EMG increase with shoulder abduction load in individuals with chronic stroke. *Clin Neurophyisol.* 2012: 123(6): 1216-1225. doi: 10.1016/j.clinph.2012.01.009.

5. **Miller LC**, Thompson CK, Negro FN, Heckman CJ, Farina D, *Dewald JPA. High-density surface EMG decomposition allows for recording of motor unit discharge from proximal and distal flexion synergy muscles simultaneously in individuals with stroke. *Conf Proc IEEE Eng Med Biol Soc.* 2014; 2014:5340-5344. doi: 10.1109/EMBC.2014.6944832.

6. Wilson JM, Thompson CK, **Miller LC**, *Heckman CJ. Intrinsic excitability of human motor units in biceps brachii versus triceps brachii. *Journal of Neurophysiology.* 2015: 113(10):3692-3699. doi: 10.1152/jn.00960.2014.

7. **McPherson LM**, Negro F, Thompson CK, Sanchez L, Heckman CJ, Dewald JP, *Farina D. Properties of the motor unit action potential shape in proximal and distal muscles of the upper limb in healthy and post-stroke individuals. *Conf Proc IEEE Eng Med Biol Soc.* 2016; 2016: 335 – 339. doi: 10.1109/EMBC.2016.7590708.

8. McPherson JG, **McPherson LM**, Thompson CK, Ellis MD, Heckman CJ, *Dewald JP. Altered neuromodulatory drive may contribute to exaggerated tonic vibration reflexes in chronic hemiparetic stroke. *Frontiers in Human Neuroscience*. 2018;12(131). doi: 10.3389/fnhum.2018.00131.

9. Thompson CK, Negro F, Johnson MD, Holmes MR, **McPherson LM**, Powers RK, Farina D, *Heckman CJ. Robust and accurate decoding of motoneuron behavior and prediction of the resulting force output. *Journal of Physiology*. 2018: 596(14): 2643-2659. doi: 10.1113/JP276153.

10. **McPherson LM**, *Dewald JPA. Differences between flexion and extension synergy-driven coupling at the elbow, wrist, and fingers of individuals with chronic hemiparetic stroke. *Clinical Neurophysiology*. 2019: 130(4): 454-468. doi: 10.1016/j.clinph.2019.01.010.

11. Thompson CK, Johnson MD, Negro F, **McPherson LM**, Farina D, *Heckman CJ. Exogenous neuromodulation of spinal neurons induces beta-band coherence during self-sustained discharge of hind limb motor unit populations. *Journal of Applied Physiology*. 2019 Oct 1; 127(4):1034-1041. doi: 10.1152/japplphysiol.00110.2019.

12. Hassan AS, Kim EH, Khurram OU, Cummings M, Thompson CK, **Miller McPherson LM**, Heckman CJ, Dewald JPA, *Negro F. Properties of motor units of elbow and ankle muscles decomposed using high-density surface EMG. *Conf Proc IEEE Eng Med Biol Soc.* 2019;2019: 3874 – 3878. doi: 10.1109/EMBC.2019.8857475

13. Hassan AS, Thompson CK, Negro F, Cummings MQ, Powers RK, Heckman CJ, Dewald JP, ***McPherson LM**. Impact of parameter selection on estimates of motoneuron excitability using paired motor unit analysis. *Journal of Neural Engineering*. 2020; 17:1. doi: 10.1088/1741-2552/ab5eda

14. Wilson JM, Thompson CK, **McPherson LM**, Zadikoff C, Heckman CJ, *MacKinnon CD. Motor unit discharge variability is increased in mild-to-moderate Parkinson's disease. *Frontiers in Neurology*. 2020; 11:477. doi: 10.3389/fneur.2020.00477.

15. Regnacq L, Giraud R, Ortega Sanabria A, Thota A, Roversi L, Rouhani M, **McPherson L**, Abbas J, Jung R, Romain O, Renaud S, Bornat Y, *Kolbl F. Evaluation of stimulation performances for safe and efficient peripheral nervous system stimulation. *Conf Proc IEEE Biomedical Circuits and Systems* 2021. doi: https://hal.archives-ouvertes.fr/hal-03542068

16. Hassan AS, Fajardo ME, Cummings M, **McPherson LM**, Negro F, Dewald JP, Heckman CJ, *Pearcey GE. Estimates of persistent inward currents are reduced in upper limb motor units of older adults. *The Journal of Physiology*. 2021; 599(21): 4865-4882. doi: 10.1113/JP282063.

17. **McPherson LM**, *Dewald JP. Abnormal synergies and associated reactions post-hemiparetic stroke reflect the muscle activation patterns of brainstem motor pathways. *Frontiers in Neurology*. 2022; doi: 10.3389/fneur.2022.934670.

18. Benedini M, Cabral HV, Cogliati M, Orizio C, Bissolotti L, **McPherson LM**, *Negro F. High-density surface electromyography allows for longitudinal assessment of the neural drive to muscle in individuals with acute stroke. *Conf Proc IEEE Methodology for eXtended Reality, Artificial Intelligence and Neural Engineering (MetroXAINE)* 2023; doi: 10.1109/MetroXRAINE58569.2023.10405698.

19. ***McPherson LM**, Reece TM, Beauchamp JA, Lohse KR. Relationships among motor unit discharge parameters used to estimate synaptic inputs to motoneurons. *Conf Proc IEEE Eng Med Biol Soc.* 2024; doi: 10.1109/EMBC53108.2024.10782880.

20. Regnacq L, Thota AK, Ortega Sanabria A, **McPherson L**, Renaud S, Romain O, Bornat Y, Abbas JJ, Jung R, *Kolbl F. Fascicle-selective kilohertz-frequency neural conduction block with longitudinal intrafascicular electrodes. *Journal of Neural Engineering.* 2025; doi: 10.1088/1741-2552/adc62a.

<u>Pre-prints:</u>

1. Hassan AS, Thompson CK, Negro F, Cummings M, Powers RK, Heckman CJ, Dewald JPA, ***McPherson LM** (2019). Sensitivity of the paired motor unit analysis for estimation of motoneuron excitability to commonly used constraints and filters. *bioRxiv*. doi: 10.1101/732982.
2. Hassan AS, Fajardo ME, Cummings M, **McPherson LM**, Negro F, Dewald JP, Heckman CJ, *Pearcey GE (2021). Estimates of persistent inward currents are reduced in upper limb motor units of older adults. *bioRxiv*. doi: 10.1101/2021.06.18.448899.
3. **McPherson LM**, *Dewald JP (2022). Abnormal synergies and associated reactions post-hemiparetic stroke reflect the neuroanatomy of brainstem motor pathways. *medRxiv*. https://doi.org/10.1101/2022.04.25.22273876.
4. Beauchamp JA, Hassan AS, **McPherson LM**, Negro F, Pearcey GEP, Cummings M, Heckman CJ, *Dewald JP (2023). Motor unit firing rate modulation is more impaired during flexion synergy-driven contractions of the biceps brachii in chronic stroke. *medRxiv*. doi: 10.1101/2023.11.22.23298905.

5. ***McPherson LM**, Lohse K, Simon S, Beauchamp JA, Negro F, Naismith R, Cross AH. Pathophysiology of voluntary motor commands at the level of the spinal motoneuron in patients with multiple sclerosis. *medRxiv*; doi: https://doi.org/10.1101/2025.08.12.25333527.

Conference Presentations:

Doctor of Physical Therapy student underlined.
MS or PhD student advisee *underlined with asterisk.
Post-doctoral fellow trainee double-underlined.

1. **Miller LC**, Dewald JPA (2008). "Quantification of finger/wrist flexion forces as a function of limb loading in chronic hemiparetic stroke and the effects of finger/wrist extensor stimulation." *Society for Neuroscience Annual Meeting*, Washington, DC.
2. **Miller LC**, Dewald JPA (2009). "Wrist/finger flexion forces and EMG as a function of shoulder abduction loading in chronic hemiparetic stroke." *Robotics: Science and Systems Conference Workshop: Understanding the Human Hand for Advancing Robotic Manipulation*, Seattle.
3. **Miller LC**, Stienen AHA, Dewald JPA (2009). "Finger/wrist flexor and biceps activity increases as a function of limb loading and reach in chronic hemiparetic stroke." *Society for Neuroscience Annual Meeting*, Chicago.
4. **Miller LC**, Dewald JPA (2011). "Wrist/finger flexion forces and EMG increase with shoulder abduction loading in chronic hemiparetic stroke." *American Physical Therapy Association Combined Sections Meeting*, New Orleans.
5. **Miller LC**, Dewald JPA (2012). "Quantification of the flexion and extension synergies at the wrist and fingers of individuals with chronic hemiparetic stroke." *American Physical Therapy Association Combined Sections Meeting*, Chicago.
6. **Miller LC,** Dewald JPA (2012). "Differential effects of shoulder abduction and adduction on involuntary behavior of the paretic hand in chronic hemiparetic stroke." *Society for Neuroscience Annual Meeting*, New Orleans.
7. **Miller LC,** McGill KC, Dewald JPA (2013). "Evidence of neural coupling between muscles of the paretic upper extremity in chronic hemiparetic stroke." *American Physical Therapy Association Combined Sections Meeting*, San Diego.
8. **Miller LC**, Dewald JPA (2013). "Effects of shoulder torque on hand function in stroke: implications for control of assistive devices." *Biomedical Engineering Society Annual Meeting*, Seattle. Platform presentation.
9. **Miller LC**, Negro F, Heckman CJ, Farina D, Dewald JPA (2013). "Evidence of common motor unit modulation among muscles of the flexion synergy in chronic hemiparetic stroke." *Society for Neuroscience Annual Meeting*, San Diego.
10. **Miller LC**, Wilson JM, Gorassini M, Farina D, Dewald JPA, Heckman CJ (2013). "Estimation of persistent inward currents in proximal vs. distal muscles in the upper extremity." *6th International IEEE EMBS Conference on Neural Engineering*, San Diego.
11. **Miller LC**, Dewald JPA (2014). "Effects of shoulder abduction/adduction torque on hand opening and closing in chronic hemiparetic stroke." *American Physical Therapy Association Combined Sections Meeting*, Las Vegas.
12. **Miller LC**, Negro F, Heckman CJ, Farina D, Dewald JPA (2014). "Evidence of common motor unit modulation among muscles of the flexion synergy in chronic hemiparetic stroke." *NIBIB Training Grantee Meeting*, Bethesda, MD.

13. **Miller LC**, Negro F, Heckman CJ, Farina D, Dewald JPA (2014). "Motor unit firing patterns during abnormal multi-joint coupling in chronic hemiparetic stroke." *The 9th International Motoneuron Meeting*, Halifax, Canada. Platform presentation. Winner of Outstanding Student Presentation.
14. **Miller LC**, Thompson CK, Negro FN, Heckman CJ, Farina D, Dewald JPA (2014). "High-density surface EMG decomposition allows for recording of motor unit discharge from proximal and distal flexion synergy muscles simultaneously in individuals with stroke," *36th International Conference of the IEEE Engineering in Medicine and Biology Society*, Chicago. Two platform presentations (scientific symposium and symposium for International Finalists for Student Paper Competition).
15. **Miller LC**, Dewald JPA (2014). "Associated reactions in paretic wrist and finger flexors are greater in response to activation of proximal vs. distal joints of the non-paretic limb in individuals with chronic stroke." *Society for Neuroscience Annual Meeting*, Washington, DC.
16. **Miller LC**, Negro F, Heckman CJ, Farina D, Dewald JPA (2015). "Motor unit coherence among muscles of the flexion synergy in individuals with chronic hemiparetic stroke." *Biomedical Engineering Society Annual Conference*, Tampa.
17. **Miller LC**, Negro F, Heckman CJ, Farina D, Dewald JPA (2015). "Motor unit coherence among muscles of the flexion synergy in individuals with chronic hemiparetic stroke." *Society for Neuroscience Annual Meeting*, Chicago.
18. Hurley DM, Hruby SA, Joshi I, Kang H, Thompson CK, **Miller LC**, Sanchez N, Powers RK, Negro F, Farina D, Dewald JPA, Heckman CJ (2015). "Mapping the discharge of motor unit populations in the human lower extremity." *Society for Neuroscience Annual Meeting*, Chicago.
19. Wilson JM, Thompson CK, **Miller LC**, Mackinnon C, Heckman CJ (2015). "Paradoxical changes in intrinsic motoneuron excitability between flexors and extensors in Parkinson's disease." *Society for Neuroscience Annual Meeting*, Chicago.
20. Thompson CK, Negro F, Johnson MD, Holmes MR, **Miller LC**, Farina D, Heckman CJ (2015). "Decorrelated neural drive to muscle from highly consistent inputs of specific sensory pathways in the *in vivo* cat." *Society for Neuroscience Annual Meeting*, Chicago.
21. **McPherson LM**, Negro F, Heinichen S, McLerran M, Rose K, Winters A, Schulz K, Thompson CK, Heckman CJ, Farina D, Dewald JPA (2016). "Coherence among motor units of flexion synergy muscles in individuals with chronic hemiparetic stroke." *American Physical Therapy Association Combined Sections Meeting*, Anaheim, CA.
22. Heinichen S, McLerran M, Rose K, Schulz K, Winters A, Thompson CK, **Miller McPherson LC**, Heckman CJ, Dewald JPA (2016). "Estimation of motor unit discharge characteristics in proximal and distal arm muscles in healthy controls and individuals post-stroke." *American Physical Therapy Association Combined Sections Meeting*, Anaheim, CA.
23. **McPherson LM**, Thompson CK, Negro F, Heckman CJ, Farina D, Dewald JPA (2016). "Analysis of motor unit behavior in proximal and distal upper limb muscles in healthy and post-stroke individuals." *Neural Control of Movement Annual Conference*, Montego Bay, Jamaica. Team platform presentation: "Control of the motoneuron: insights from the discharge of motor unit populations."
24. **McPherson LM**, Negro F, Thompson CK, Heckman CJ, Farina D, Dewald, JPA (2016). "Differences in motor unit discharge characteristics among proximal and distal muscles of the upper limb in individuals with chronic hemiparetic stroke." *International Society of Electrophysiology and Kinesiology Conference*, Chicago. Symposium presentation.
25. **McPherson LM**, Negro F, Thompson CK, Sanchez L, Heckman CJ, Dewald JP, Farina D (2016). "Properties of the motor unit action potential shape in proximal and distal muscles of the upper limb

in healthy and post-stroke individuals." *38th International Conference of the IEEE Engineering in Medicine and Biology Society*, Orlando. Platform presentation.

26. **McPherson LM**, Negro F, Thompson CK, Farina D, Heckman CJ, Dewald JPA (2016). "Motor unit discharge characteristics differ among proximal and distal muscles of the upper limb in healthy and post-stroke individuals." *Society for Neuroscience Annual Meeting*, San Diego.
27. **McPherson LM**, Negro F, Thompson CK, Rendos NK, Farina D, Heckman CJ, Dewald JPA (2017). "Motor unit rate modulation differs among proximal and distal muscles of the upper limb in healthy and post-stroke individuals." *Progress in Motor Control Meeting*, Miami.
28. **McPherson LM**, Wilson JM, Rendos NK, Powers R, Heckman CJ, Thompson CK (2017). "The distribution of motoneuron excitability among upper extremity motor pools." *Society for Neuroscience Annual Meeting*, Washington, D.C.
29. Garmirian LR, **McPherson LM**, Acosta AM, Dewald JA (2018). "Atrophy and voluntary activation of paretic elbow muscles in individuals with chronic hemiparetic stroke: preliminary findings." *American Physical Therapy Association Combined Sections Meeting*, New Orleans.
30. Kim C, Perez MA, **McPherson LM** (2018). "Characterizing neural control of precision and power grip tasks using motor unit coherence." *University of Miami Neural Engineering Research Symposium*, Miami, FL.
31. Hassan A*, Cummings M, Heckman CJ, **McPherson LM**, Dewald JPA (2018). "Motor unit firing patterns in stroke." *11th Meeting of the International Motoneuron Society,* Boulder, CO. Platform presentation.
32. Kim C, Perez MA, **McPherson LM** (2018). "Characterizing neural control of precision and power grip tasks using motor unit coherence." *11th Meeting of the International Motoneuron Society,* Boulder, CO.
33. Hassan A*, Cummings M, Heckman CJ, **McPherson LM**, Dewald JPA (2018). "Rate modulation and further evidence for changes in persistent inward currents during isometric dynamic torque tasks in chronic hemiparetic stroke." *International Society of Electromyography and Kinesiology Conference*, Dublin, Ireland. Symposium presentation.
34. **McPherson LM**, Kim C, Rendos N, Chu A*, Espinal A, Zaveri S, Carreño J, Vega P, Varghese R (2018). Differences in motor unit discharge characteristics between ankle plantarflexors and dorsiflexors during steady contractions. *Society for Neuroscience Annual Meeting*, San Diego.
35. Kim C, Perez MA, **McPherson LM** (2018). "Motor unit coherence indicates changes in corticospinal influence during different hand motor tasks." *Society for Neuroscience Annual Meeting*, San Diego.
36. Hassan AS*, Kim EH, Khurram OU, Cummings M, Thompson CK, **McPherson LM**, Heckman CJ, Dewald JPA, Negro F (2019). "Properties of motor units of elbow and ankle muscles decomposed using high-density surface EMG." *41st International Conference of the IEEE Engineering in Medicine and Biology Society*, Berlin. Platform presentation.
37. Thompson CK, **McPherson LM**, Negro F (2019). **"**High-Density EMG neurobiomarkers for Improving Rehabilitation Therapies." Hosts of Pre-Congress Workshop, Rehab Week Congress, Toronto, CA.
38. Thompson CK, Kmiec T, Kumar P, **McPherson LM**, Negro F (2019). "Within and across day repeatability of estimates of human spinal motoneuron excitability." Society for Neuroscience Annual Meeting, Chicago, IL.

39. Negro F, Martinez-Valdes E, **McPherson LM**, Thompson CK, Cudicio A, Yavuz U (2019). "The need for accurate decomposition methods for the precise estimation of the neural drive to muscle." Society for Neuroscience Annual Meeting, Chicago, IL.
40. **McPherson LM**, Hassan AS*, Negro F, Cummings M, Powers RK, Dewald JP, Heckman CJ, Thompson CK (2019). "Factors influencing estimation of motoneuron excitability using analysis of motor unit populations." Society for Neuroscience Annual Meeting, Chicago.
41. Hassan AS*, Cummings MQ, Thompson CK, Negro F, Powers RK, Heckman CJ, **McPherson LM**, Dewald JP (2019). "The relationship between stroke-induced changes in motor unit firing behavior and the expression of motor deficits." Society for Neuroscience Annual Meeting, Chicago.
42. **McPherson LM**, Thompson CK, Hyngstrom A, Heckman CJ, Negro F (2020). "Symposium: International Motoneuron Society: from motoneuron activity to motor control." International Society for Electromyography and Kinesiology, virtual congress.
43. **McPherson LM**, Negro F, Thompson CK, Lohse K, Powers RK, Farina D, Heckman CJ, Dewald, JP (2021). "Pathological inhibition limits motor unit rate modulation during voluntary contractions in a muscle-dependent manner post-stroke." American Society for Neurorehabilitation Annual Meeting, virtual.
44. Ortega A*, Thota AK*, Bornat Y, Kölbl F, Romain O, Renaud S, **McPherson LM**, Abbas J, Jung R (2021). "Improving nerve fiber selectivity of intrafascicular stimulation." LatinX Biomedical Engineering Symposium, virtual.
45. Abbas J, Jung R, Bornat Y, Kölbl F, **McPherson LM**, Thota AK, Regnacq L, Ortega A*, Rouhani M, Romain O, Crook S, Renaud S (2021). Improving selectivity with intrafascicular stimulation: computational and experimental studies. 7th Annual BRAIN Initiative Investigators Meeting, virtual.
46. Regnacq L, Giraud R, Ortega Sanabria A*, Thota A*, Roversi L, Rouhani M, **McPherson L**, Abbas J, Jung R, Romain O, Renaud S, Bornat Y, Kolbl F (2021). Evaluation of stimulation performances for safe and efficient peripheral nervous system stimulation. 2021 IEEE Biomedical Circuits and Systems Conference (BioCAS): "Restoring Vital Functions by Electronics: Achievements, Limitations, Opportunities, and Challenges," Berlin, Germany.
47. Pearcey GE, Hassan AS*, Fajardo ME, Cummings M, Negro F, **McPherson LM**, Dewald JP, Heckman CJ (2022). Effects of aging on persistent inward currents of human motoneurons. International Society for Electromyography and Kinesiology 2022 Congress. Quebec City, Canada.
48. Ortega Sanabria A*, Thota AK*, Regnacq L, Rouhani M, **McPherson LM**, Abbas JJ, Bornat Y, Kolbl F, Jung R (2022). Selective activation of nerve fiber subpopulations with intrafascicular stimulation. Society for Neuroscience Annual Meeting. San Diego, CA.
49. Ortega Sanabria A*, Rouhani M, Thota AK*, Regnacq L, **McPherson LM**, Kolbl F, Bornat Y, Jung R, Abbas JJ (2022). Improving selectivity for bioelectronic therapies with intrafascicular stimulation (BioTIFS). Collaborative Research in Computational Neuroscience (CRCNS) PI Meeting, Atlanta, GA.
50. Reece TR*, McCane LM, McPherson JG, Negro F, Naimsith R, Cross AH, **McPherson LM** (2023). Motor unit population behavior of involuntary muscle spasms during voluntary contractions in a patient with multiple sclerosis. Progress in Clinical Motor Control II Meeting, Chicago, IL.
51. **McPherson LM**, Reece TR*, McCane LM, Lohse KR, Negro F, Lang C, Naismith R, Cross AH (2023). Pathophysiology of voluntary motor commands in patients with multiple sclerosis identified using reverse engineering of motor unit population discharge. Progress in Clinical Motor Control II Meeting, Chicago, IL.

52. Reece TR*, McCane LM, McPherson JG, Negro F, Naimsith R, Cross AH, **McPherson LM** (2023)**.** Motor unit population behavior of involuntary muscle spasms during voluntary contractions in a patient with multiple sclerosis. Society for Neuroscience Annual Conference, Washington DC.
53. **McPherson LM**, Reece TR*, McCane LM, Lohse KR, Negro F, Lang C, Naismith R, Cross AH (2023). Pathophysiology of voluntary motor commands in patients with multiple sclerosis identified using reverse engineering of motor unit population discharge. Society for Neuroscience Annual Conference, Washington DC.
54. Ortega A*, Rouhani M, Thota AK*, Asbee J, Regnacq L, Bornat Y, Kolbl F, **McPherson LM**, Abbas J, Jung R (2023). Selective activation of nerve fiber subpopulations with intrafascicular stimulation depends on size of electrode active site. Society for Neuroscience Annual Conference, Washington DC.
55. Ortega A*, Rouhani M, Thota AK*, Asbee J, Regnacq L, Bornat Y, Kolbl F, **McPherson LM**, Abbas J, Jung R (2023). Selective activation of nerve fiber subpopulations with intrafascicular stimulation depends on size of electrode active site. LatinXinBME Symposium, Seattle, WA.
56. **McPherson LM**, Reece TR*, Simon S, Lohse K, Negro F, Lang C, Naismith R, Cross A (2024). Pathophysiology of voluntary motor commands in patients with multiple sclerosis identified using reverse engineering of motor unit population discharge. Association for Clinical and Translational Science Annual Meeting, Las Vegas, NV. *Selected as Top 50 Abstract (out of 568 accepted).
57. **McPherson LM**, Reece TR*, Simon S, Lohse K, Negro F, Lang C, Cross A (2024). Pathophysiology of voluntary motor commands in patients with multiple sclerosis identified using reverse engineering of motor unit population discharge. 6th Annual Washington University Institute for Clinical and Translational Sciences Symposium, St. Louis, MO.
58. **McPherson LM**, Reece TR*, Simon S, Free D, Lohse K, Cross A (2024). Heterogeneity of pathophysiological voluntary motor commands in patients with multiple sclerosis. Society for Neuroscience Annual Meeting, Chicago, IL.
59. Simon S, Free D, Reece TR*, Lohse K, Cross A, ***McPherson LM** (2024). Longitudinal assessment of voluntary motor commands to spinal motoneurons in patients with multiple sclerosis. Society for Neuroscience Annual Meeting, Chicago, IL.
60. Free D, Reece TR*, Simon S, Pearcey G, Beauchamp D, Jenz S, Fajardo M, Heckman C, Lohse K, **McPherson LM** (2024). Latent variables underlying motor unit firing patterns in a diverse set of muscles. Society for Neuroscience Annual Meeting, Chicago, IL.
61. Beauchamp JA, Hassan AS, **McPherson LM**, Plaisier T, Pearcey GEP, Negro F, Urday S, Heckman CJ, *Dewald JP (2024). Monoaminergic contributions to post-stroke motor impairments. Society for Neuroscience Annual Meeting, Chicago, IL.
62. Ortega Sanabria A, Regnacq L, Asbee L, Thota AK, Abbas JJ, McPherson LM, Jung R (2024). Neuromodulation of nerve fiber activation via intrafasicular stimulation: effects of non-rectangular waveform shapes. Society for Neuroscience Annual Meeting, Chicago, IL.
63. Pearcey GEP, Beauchamp J, Jenz S, Fajardo M, **McPherson LM**, *Heckman CJ (2024). Diverse motor unit firing patterns reflect divergent motor command structure across human arm muscles. Society for Neuroscience Annual Meeting, Chicago, IL.
64. **McPherson LM**, Simon S, Reece T, Free D, Lohse K, Naismith R, Cross A (2025). Heterogeneity of pathophysiological voluntary motor commands in patients with multiple sclerosis. American Physical Therapy Association Combined Sections Meeting, Houston, TX.
65. Simon S, Free D, Reece T, Lohse K, Naismith R, Cross A, **McPherson LM** (2025). Subclinical pathophysiology of motor processing in people with multiple sclerosis. American Physical Therapy Association Combined Sections Meeting, Houston, TX.

66. **McPherson LM**, Lohse K, Simon S, Free D, Naismith R, Cross A (2025). Heterogeneity of pathophysiological voluntary motor commands in patients with multiple sclerosis. 14th International Symposium on Gait and Balance in Multiple Sclerosis. Denver, CO.
67. **McPherson LM**, Lohse K, Simon S, Free D, Beauchamp JA, Naismith R, Cross A (2025). Heterogeneity of pathophysiological voluntary motor commands in patients with multiple sclerosis. International Motoneuron Meeting, Newfoundland, CA.
68. Ortega Sanabria A, Holmes A, Regnacq L, Asbee J, Irby D, Lowery J, **McPherson LM**, Jung R, Abbas JJ (2025). Enhancing selectivity of neuromodulation with intrafascicular stimulation of the vagus nerve. Society for Neuroscience Annual Meeting, San Diego, CA.