Rebecca E. Abbott, PT, DPT, PhD
University of Colorado School of Medicine
Department of Physical Medicine and Rehabilitation
Physical Therapy Program | Hybrid Pathway
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Education:

2024	Postdoc, Rehabilitation Science	University of Minnesota, Minneapolis, MN
2021	PhD, Mechanical Engineering	Northwestern University, Evanston, IL
2018	Doctor of Physical Therapy	Northwestern University, Chicago, IL
2008	Bachelor of Science, Mechanical Engineering	Tufts University, Medford, MA

Licensure Information:
Colorado #PTL.0019732
Minnesota #12539

Employment and Positions Held:

2024 – present	Assistant Professor, University of Colorado School of Medicine PM&R, Anschutz Medical Campus, Aurora, CO
2021 – 2024	Postdoctoral Fellow, Department of Rehabilitation Medicine, University of Minnesota, Minneapolis, MN
2022 - 2024	Physical Therapist – Part-Time, TRIA Orthopedics, Bloomington, MN
2019 - 2021	Physical Therapist – Part-Time, Shirley Ryan Ability Lab, Chicago, IL
2012 - 2021	Pre-Doctoral Researcher, Center for Robotics and Biosystems, Northwestern McCormick School of Engineering, Evanston, IL | Neuromuscular Imaging and Research Lab, Northwestern University Physical Therapy & Human Movement Sciences, Chicago, IL
2008 – 2011	Process Engineer, Allergan Inc. (Serica Technologies Inc.), Medford, MA

Teaching Experience:

2024 – present	Assistant Professor, University of Colorado School of Medicine PM&R, Anschutz Medical Campus, Aurora, CO
2022 – 2024	Instructor, University of Minnesota Doctor of Physical Therapy Program, PT 8193 Research Problems
2022	Contract Educator, Instructor, University of Minnesota Rehabilitation Science Program:

	Advanced Biomechanics II, Applied Data Acquisition & Processing
2020	Lecturer, Northwestern University Orthopedic Physical Therapy Fellowship, Cervical and Lumbar Spine (Fall 2020)
2020 – 2021	Instructor, Northwestern University Doctor of Physical Therapy, Kinesiology I and II (Fall 2020, Winter 2021), Neuroscience I (Spring 2020), Electrophysiology (Spring 2021), and Complex Patients (Spring 2021)
2020	Center for the Integration of Research, Teaching, and Learning Program Certificate, Northwestern University: Demonstrates knowledge of effective teaching practice and evidence-based teaching.
2019	Turning Your Research into Teaching (TYRIT) Program, Northwestern University: 7-week program focused on course design and development of a full course syllabus.
2019	Mentored Discussions of Teaching (MDT) Program, Northwestern University: structured faculty mentorship and observation over a full academic quarter
2019	Teaching Assistant, Northwestern University Department of Mechanical Engineering: Theory of Machines – Dynamics (Fall 2019), Mechanics of Sports (Spring 2019)

Peer Reviewed Publications:

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/1bmKTBqxG-0gfS/bibliography/public/

Abbott, R., Nishimwe, A., Wiputra H., Breighner, R., and Ellingson, AM. A Super-Resolution Algorithm to Fuse Orthogonal CT Volumes using OrthoFusion. *Scientific Reports,* 15(1), p.1382. (2025). doi: 10.1038/s41598-025-85516-y.

Abbott, R., Cornwall, J., Crawford, R., De Martino, E., Elliott, JM., Galloway, GJ., Hides, J., Hoggarth, MA., McMahon, K., McKay, M., Peek, A., Perraton, Z., Reeve, A., Sheldrick, K., Seitz, A., Semciw, A., Smith, AC., Franettovich Smith, M., Stone, D., Walton, D., Weber, KA., Wesselink, E. **Chapter 4.5.3 Advances in Magnetic Resonance Imaging Measures. Grieve's Modern Musculoskeletal Physiotherapy, 5th Edition.** United Kingdom: Elsevier Health Sciences, 2024.

McKay MJ, Weber KA, Wesselink EO, Smith ZA, **Abbott R**, Anderson DB, Ashton-James CE, Atyeo J, Beach AJ, Burns J, Clarke S, et al. MuscleMap: An Open-Source, Community-Supported Consortium for Whole-Body Quantitative MRI of Muscle. *Journal of Imaging*. 10(11), p.262. (2024). doi: 10.3390/jimaging10110262.

Abbott, R., Elliott, J., Murphey, T. and Acosta, A.M. The role of the deep cervical extensor muscles in multi-directional isometric neck strength. *Journal of Biomechanics*, 168, p.112096. (2024). doi: 10.1016/j.jbiomech.2024.112096.

Nikpasand, M., **Abbott, R**., Kage, C., Singh, S., Winkelstein, B., Barocas, V., Ellingson, A. Cervical Facet Capsular Ligament Mechanics: Estimations based on Subject-Specific Anatomy and Kinematics. *JOR Spine*, (2023). doi: 10.1002/jsp2.1269.

Koroth, J., Buko, E., **Abbott, R**., Johnson, C., Ogle, B., Stone, L., Ellingson, A., Bradley, E. Macrophages and Intervertebral Disc Degeneration. International Journal of Molecular Sciences 24, no. 2 (2023): 1367.

Weber, K.A., **Abbott, R**., Bojilov, V. et al. Multi-muscle deep learning segmentation to automate the quantification of muscle fat infiltration in cervical spine conditions. Sci Rep 11, 16567. (2021). doi: 10.1038/s41598-021-95972-x.

Smith, A.C., Albin, S.R., **Abbott, R**. et al. Confirming the geography of fatty infiltration in the deep cervical extensor muscles in whiplash recovery. Sci Rep 10, 11471 (2020).

Abbott, R., Peolsson, A., West, J., Elliott, J., et al. The qualitative grading of muscle fat infiltration in whiplash using fat and water magnetic resonance imaging. The Spine Journal, 18(5), pp.717-725 (2018). doi: 10.1016/j.spinee.2017.08.233.

Elliott, J., Cornwall, J., Kennedy, E., **Abbott, R**. and Crawford, R. Towards defining muscular regions of interest from axial magnetic resonance imaging with anatomical cross-reference: part II - cervical spine musculature. *BMC Musculoskeletal Disorders*, 19(1). (2018). doi 10.1186/s12891-018-2074-y.

Crawford, R., Cornwall, J., **Abbott, R**. and Elliott, J. Manually defining regions of interest when quantifying paravertebral muscles fatty infiltration from axial magnetic resonance imaging: a proposed method for the lumbar spine with anatomical cross-reference. BMC Musculoskeletal Disorders, 18(1). (2017).

Abbott, R., Pedler, A., Sterling, M., Hides, J., Murphey, T., Hoggarth, M., & Elliott, J. The geography of fatty infiltrates within the cervical multifidus and semispinalis cervicis in individuals with chronic whiplash-associated disorders. Journal of Orthopaedic & Sports Physical Therapy, 45(4), 281-288. (2015).

Smith, A., Parrish, T., **Abbott, R**., Hoggarth, M., Mendoza, K., Chen, Y. and Elliott, J. Muscle-fat MRI: 1.5 tesla and 3.0 tesla versus histology. Muscle & Nerve, 50(2), pp.170-176. (2014).

Abbott, R., Parrish, T., Hoggarth, M., Smith, A., & Elliott, J. Letter to the editor regarding Smuck M, Cristostomo RA, Demirjian R, et al. Morphologic changes in the lumbar spine after lumbar medial branch radiofrequency neurotomy: a quantitative radiological study. The Spine Journal, 14(6), 1088-9. (2014).

Presentations (Platform, Grand Rounds, Invited Lectures):

Abbott, R. Unlocking Biomechanisms in Rehabilitation Research through Computational Musculoskeletal Modeling. CONVERGE 2025 – Connecting Manual Therapy with Mechanistic Insights Conference. Feb 22, 2025. Virtual. Invited Talk.

Kage CC., **Abbott R.**, MacEwen M, Nishimwe A, Sembrano J, Helwig N, Ellingson AM. In Vivo Segmental Contributions to Planar Motion: Implications for those with Chronic Neck Pain. American Society of Biomechanics (ASB). Madison, Wisconsin. 2024.

Abbott, R., Ludewig, P., Barocas, V., Ellingson, A. Prevalence and Clinical Presentation of Chronic Neck Pain in Individuals with Generalized Joint Hypermobility. Midwest TL1 Research Summit. Sept 29-30, 2023. Platform Presentation.

MacEwan, M., **Abbott, R**., Barocas, V., Ellingson, A. Dynamic Compliance Vector: Utility for Quantifying Spinal Mechanics. American Society of Biomechanics (ASB) 2023. Platform Presentation.

Abbott, R., Breighner, R., Ellingson, A. 3-D Reconstruction for Creating Bone Models from Low-Resolution Clinical

CT. Mayo Clinic and University of Minnesota Musculoskeletal Research Symposium. Mayo Clinic. Rochester, MN. September 14, 2022. Invited Lecture.

Abbott, R., Breighner, R., Ellingson, A. Super-Resolution 3-D Reconstruction for Creating Bone Models from Low-Resolution Clinical CT. North American Congress on Biomechanics (NACOB). Ottowa, Canada. August 2022. Platform Presentation.

Abbott R, Murphey T. Automation and Information Maximization for Biomechanics-based Diagnostics and Rehabilitation. Robotics Science and Systems (RSS) AI in Rehabilitation Workshop. Freiburg, Germany. 2019. Platform Presentation.

Abbott, R., Hoggarth, M., Elliott, J. The spatiotemporal changes in neck muscle fat infiltration (MFI) in Whiplash-Associated Disorders (WAD). APTA Combined Sections Meeting. New Orleans, LA, USA. 2018. Platform Presentation.

Abbott, R., Pedler, A., Sterling, M., Hides, J., Murphey, T., Hoggarth, M., Elliott, J. The distribution of muscle fat infiltration within the deep extensor muscles in whiplash-associated disorders. APTA Combined Sections Meeting. Indianapolis, IN, USA. 2015. Platform Presentation.

Abbott, R., Elliott, J., Acosta, A., Murphey, T. Functional Consequences of Cervical Muscle Fat Infiltration in Whiplash-Associated Disorders (WAD). 12th International Society for the Study of Pain (IASP) Research Symposium. Aarhus, Denmark. 2014. Platform Presentation.

Presentations (Abstract & Poster):

Kage C., **Abbott**, **R**., MacEwan, M., Nishimwe, A., Sembrano, J., Helwig, N., Ellingson, A. In Vivo Segmental Contributions to Planar Motion: Implications for those with Chronic Neck Pain. American Society of Biomechanics (ASB) Conference. Madison, WI. 2024.

Abbott R, Dalske K, Molenaar C, Oriala DC, Volin B, Ellingson AM. Relationship between Generalized Joint Hypermobility and Chronic Joint Pain Varies with Age, Sex, and Criteria. American Physical Therapy Association (APTA) Combined Sections Meeting (CSM) Conference. Boston, MA. 2024.

Abbott, R., Dalske, K., Molenaar, C., Oriala, D., Volin, B., Ellingson, A. Generalized Joint Hypermobility and Neck Pain: Effects on Range of Motion and Strength. American Society of Biomechanics Conference 2023. Poster Presentation.

Abbott, R., Dalske, K., Molenaar, C., Oriala, D., Volin, B., Ellingson, A. Generalized Joint Hypermobility: Prevalence and Effects on Range of Motion and Strength. American Physical Therapy Association in Motion Conference 2023. Minneapolis, MN. Poster Presentation.

Abbott, R., Ludewig, P., Barocas, V., Ellingson, A. Generalized Joint Hypermobility and Chronic Neck Pain: An Under-Recognized Neck Pain Subgroup. CTSI Translational Science Symposium. September 15, 2022. Poster Presentation

Abbott R, Elliott J, Acosta A, Murphey T. The Role of Deep Neck Extensors in Multi-Directional Isometric Neck Strength. APTA Combined Sections Meeting. 2021 Virtual Poster Presentation (due to Covid)

Abbott R, Acosta A, Murphey T, Elliott J. Computational Modeling of the Effects of Cervical Multifidus Weakness of Force Generation at the Head. APTA Combined Sections Meeting. Denver, CO, USA. 2020.

Abbott R, Murphey T. Automation and Information Maximization for Biomechanics-based Diagnostics and Rehabilitation. Robotics Science and Systems (RSS) AI in Rehabilitation Workshop. Freiburg, Germany. 2019.

Smith AC, Tappan R, O'Dell DR, Weber KA, **Abbott R**, Hoggarth MA, Elliott JM. Imaging of spinal trauma: can protons inform prognosis and improve outcomes?" APTA Combined Sections Meeting Academy of Neurologic Physical Therapy Educational Session. New Orleans, LA USA. 2018. Poster Presentation.

Abbott, R, Elliott J, Peolsson A, West J, Aslund,U, Karlsson,A. Dahlquvist Leinhard O. Muscle Quality Matters: Translation of Muscle Fat Infiltration Analysis to Clinical Practice and Biomechanical Modeling. APTA Combined Sections Meeting. San Antonio, TX, USA. 2017. Poster Presentation.

Abbott R, Elliott J., Peolsson A, West J, Aslund U, Karlsson A, Dahlquvist Leinhard O. The Qualitative Grading of Muscle Fat Infiltration in Neck Muscles Using Fat/Water MRI. International Society of Electrophysiology and Kinesiology (ISEK). Chicago, IL, USA. 2016. Poster Presentation.

Smith AC, Parrish TB, **Abbott R**, Hoggarth MA, Mendoza K, Chen YF, Elliott JM. Measuring skeletal muscle and relative fat-to-water percentage: the comparison of MR Imaging versus histology. APTA Combined Sections Meeting, Las Vegas, Nevada, USA, 2014. Poster Presentation.

Abbott R, Elliott J, Acosta, A, Murphey, T. Biomechanical Consequences of Cervical Muscle Fat Infiltration in Whiplash-Associated Disorders (WAD). 7th World Congress of Biomechanics. Boston, MA, USA. 2014. Poster Presentation.

Abbott R, Murphey T, Lin A, Elliott J. Quantification of Cervical Spine Muscle Fat with Fat/Water Separation MRI and Muscle Biopsy. Conference and Exposition of the APTA. Salt Lake City, UT, USA. 2013. Poster Presentation.

Funded/ In Review Grant Activity

Ongoing Support

In Review

NIH K01 Career Development Award Abbott (PI) 2025 – In Review

Chronic joint pain in generalized joint hypermobility: the role of dynamic joint stability

The goal of this study is to investigate biomechanisms underlying chronic joint pain in hypermobility disorders by quantitatively measuring the passive, active, and neural components of dynamic joint stability and central sensitization.

Completed Support

NIH F32 AR082276 Abbott (PI) 2023-2024

Generalized joint hypermobility and chronic joint pain: Associations with dynamic cervical spine instability

The goal of this study is to characterize and identify mechanisms underlying chronic neck pain in generalized joint hypermobility, with the long-term goal of developing effective treatments and improving outcomes in chronic neck pain.

NIH TL1 TR002493 Fulkerson (PI) 2022-2023

NRSA Training Core: The mission of the TL1 Program is to improve human health by catalyzing and accelerating the translation of research findings to the community. This is a training program for predoctoral and postdoctoral trainees that integrates a mentored research experience, an individualized curriculum, and professional development activities that focus on team-based research and effective collaboration and communication with the larger community.

NIH T32 EB009406 Dewald (PI) 2012-2014, 2020
Training Grant – Neurobiology of Movement and Rehabilitation Sciences
The mission of this program is to train students with clinical and life/applied science backgrounds to become rehabilitation scientists in basic, translational or clinical research. The training program focuses on the neurobiology of movement and rehabilitation sciences, with three main goals: 1) understanding the neurobiology of movement behavior and disorders, 2) identifying and addressing the need for quantitative methods, 3) applying this knowledge to the development of effective rehabilitation interventions.
Role: PhD Candidate Trainee

Membership in Scientific/ Professional Organizations:

2024 – present	Colorado Physical Therapy Association Member
2021 – 2024	Minnesota Physical Therapy Association Member (MPTA)
2021 – present	American Society of Biomechanics (ASB) Member
2018 – 2021	Institute of Electrical and Electronics Engineers (IEEE) Member Sections: Robotics and Automation Society (RAS), Engineering in Medicine and Biology Society (EMBS)
2015 – present	Reviewer: Journal of Orthopedic and Sports Physical Therapy (JOSPT), The Spine Journal, Spine
2011 – present	American Physical Therapy Association Member, Sections: Orthopedics, Research
2011 – 2021	Illinois Physical Therapy Association (IPTA) Member

Consultant and Advisory Positions Held:

Manuscript Reviewer (ongoing). *Journal of Sports and Physical Therapy, Journal of Biomechanics, Spine, The Spine Journal*

Services to Students and the University:

2024 – present	CU PT Diversity Equity Inclusion Committee (member)
2024 – present	Faculty Advisor to the Hybrid PT Class of 2026

Honors, Awards, and Recognition:

2023 – 2024	NIH F32 Ruth L. Kirschstein Postdoctoral Individual National Research Service Award National Institute of Arthritis and Musculoskeletal and Skin Diseases. Grant Number F32 AR082276. “Generalized joint hypermobility and chronic joint pain: Associations with dynamic cervical spine instability”
2023	3-Minute Thesis Finalist, NIH ACTS Conference, DC
2022 – 2023	NIH TL1 TRACT Postdoctoral Fellowship Awarded to 2 postdoctoral fellows per year for financial support, mentorship, and professional development training.

2021	DPT/PhD Scholar Award, Northwestern University Feinberg School of Medicine Dual doctorate program accepting 2 applicants per year. Provides full financial support for the Doctorate of Physical Therapy Program and PhD in Engineering.
2012-2014, 2020	NIH NIBIB T32 Training Grant Awarded to select clinically-focused engineering PhD students for financial support.
2008	Tufts Senior Award, Tufts University Each year, the Tufts University Alumni Association has recognized 6 to 12 members of the senior class for their academic achievement, campus and community participation, and outstanding leadership.
2007	O'Leary Design Award for best Senior Design Project Awarded to the Mechanical Engineering senior who has made outstanding contributions in the area of design.
2006	Ellen C Myers Memorial Award for Perseverance Awarded to a junior or senior who has shown character, diligence, and perseverance in achieving high scholarship standards in the face of adverse circumstances.
2005	W Murray Kenney Award for positive attitude and persistence Awarded yearly to an athlete who overcame a significant obstacle
2004-2008	Computer Science, Engineering, and Math Scholars (CSEMS) Scholarship

Continuing Education Attended:

2025: Combined Sections Meeting (CSM), American Physical Therapy Association, Houston, Texas, Feb

- Dual Dysfunction: Biomechanics and Central Nervous System Factors in Patients with Musculoskeletal Pain and Disability
- Equitable Education: Best Practices for Implementing Reasonable Accommodations for Health Professions Trainees (HPTs) with Disabilities
- A Unifying Human Movement Framework for PT Practice and Research: Where Do We Stand?

The Ehlers-Danlos Society Global Learning Conference 2025, Virtual, Feb 7-9, 2025.

- Exploring Common Complications in EDS & HSD
- Evolving Care Models & Technology, Innovations in Service Delivery
- Exploring Movement & Exercise Participation

Current Teaching Responsibilities:

DPTR 5101 HY Movement Science I, Hybrid Pathway,	Fall 2024	Course Coordinator, Instructor
DPTR 6102 HY Movement Science II, Hybrid Pathway,	Fall 2024	Course Coordinator, Instructor