



## Mark McLaughlin Mañago, PT, DPT, PhD, NCS

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### **Education:**

University of Colorado Denver Graduate School Anschutz Medical Campus Aurora, CO	PhD, Clinical Science	2018
University of Colorado Denver Health Sciences Center Aurora, CO	Doctor of Physical Therapy	2008
University of Colorado Denver Health Sciences Center Denver, CO	MS, Physical Therapy	2005
Carleton College Northfield, MN	BA, Spanish Literature	1997

### **Licensure Information/Registration Number:**

Colorado Physical Therapist Licensure #8935	2005-present
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### **Certifications:**

Neurologic Clinical Specialist, American Board of Physical Therapy Specialties	2009, 2019
Advanced Credentialed Clinical Instructor, American Physical Therapy Association	2011
Credentialed Clinical Instructor, American Physical Therapy Association	2007
Credentialed Medical Interpreter (Spanish), University of Colorado Hospital	2005

### **Employment and Positions Held:**

Assistant Professor Physical Therapy Program, University of Colorado Denver, Anschutz Medical Campus, Aurora, CO	July 2018 - Present
Research Health Scientist Specialist	Jan 2023 - Present

VA Eastern Colorado Health Care System, Aurora, CO	July 2020 – Dec 2022
Rehabilitation Researcher (Without Compensation) VA Eastern Colorado Health Care System, Aurora, CO	Aug 2016 – June 2018
Senior Instructor Physical Therapy Program, University of Colorado Denver, Anschutz Medical Campus, Aurora, CO	Feb 2011 – Aug 2016
Physical Therapist Specialist University of Colorado Hospital, AF Williams Outpatient Clinic, Denver, CO	2009 - August 2013
Adjunct Clinical Instructor Physical Therapy Program, University of Colorado Denver, Anschutz Medical Campus, Aurora, CO	2005 – January 2011

### **Scholarly Agenda:**

My current scholarly agenda is to advance knowledge of resistance training for people with MS across the spectrum of disability by 1) optimizing delivery, 2) understanding mechanisms, 3) determining impact, and 4) defining its relative role alongside other interventions.

My long-term career goal is to become a leader in rehabilitation science with expertise in developing, optimizing, and implementing interventions that improve participation, quality of life (QOL), and physical health outcomes in people with MS and other populations with disability.

### **Peer Reviewed Publications:**

1. Gann EJ, Mañago MM, Allen D, Celnikier MS, Block VJ. Feasibility of Telerehabilitation-Monitored Functional Electrical Stimulation on Walking and Quality of Life in People with Multiple Sclerosis: A Case Series. *International Journal of MS Care*. 2024; In Press
2. Swink LA, Thornton WA, Nearing KA, Mañago MM. A qualitative study of low-load resistance training with blood flow restriction in people with advanced multiple sclerosis. *Physiotherapy Theory and Practice*. 2024;0(0):1-10.
3. Anderson CB, Fatone S, Mañago MM, et al. Development and alpha testing of a patient shared decision aid for prosthesis design for new lower limb prosthesis users. *Prosthetics and Orthotics International*. 2024; Online May 3.
4. Chen VL, Hildebrand AD, Mañago MM, Cameron M. Self-assessed Dynamic Gait Index correlates with physical therapist assessed Dynamic Gait Index in people with multiple sclerosis. *Multiple Sclerosis and Related Disorders*. 2023;80:105101.

5. **Mañago MM**, Will R, Strahler T, Van Valkenburgh L, Harris-Love MO, Forster JE, Cameron MH, Christiansen CL. Blood Flow Restriction and Veterans with Multiple Sclerosis (BRaVe-MS) and Advanced Disability: Protocol for a Randomized Controlled Trial. *Physical Therapy*. 2024; pzae037.
6. **Mañago MM**, Cohen ET, Alvarez E, Hager ER, Owens JG, Bade M. Feasibility of Low-Load Resistance Training Using Blood Flow Restriction for People with Advanced Multiple Sclerosis: A Prospective Cohort Study. *Physical Therapy*. 2024; 104(1).
7. **Mañago MM**, Seamon BA, Boncella KL, et al. Ultrasound Measures of Muscle Morphology in People with Multiple Sclerosis are Associated with Muscle Performance and Functional Mobility. *Multiple Sclerosis and Related Disorders*. 2023;75:104759.
8. **Mañago MM**, Cohen ET, Cameron MH, Christiansen CL, Bade M. Reliability, Validity, and Responsiveness of the Patient-Specific Functional Scale for Measuring Mobility-Related Goals in People with Multiple Sclerosis. *Journal of Neurologic Physical Therapy*. 2023; 47(3):139-145.
9. Anderson CB, Fatone S, **Mañago MM**, et al. Improving shared decision-making for prosthetic care: a qualitative needs assessment of prosthetists and new lower-limb prosthesis users. *Prosthet Orthot Int*. Published online May 25, 2022. doi:[10.1097/PXR.000000000000142](https://doi.org/10.1097/PXR.000000000000142)
10. **Mañago MM**, Kimbrell K, Hager ER, Dwight H, Owens J, Bade M. Clinical use of blood flow restriction in people with neurologic conditions: a cross-sectional survey. *J Phys Ther Sci*. 2022;34(4):275-283. doi:[10.1589/jpts.34.275](https://doi.org/10.1589/jpts.34.275)
11. Kline PW, Christiansen CL, Judd D, **Mañago MM**. Clinical Utility of the Trendelenburg Test in People with Multiple Sclerosis. *Physiotherapy Theory and Practice*. 2022. doi:<http://dx.doi.org/10.1080/09593985.2022.2030446>
12. Shields RK, Benchmarking Research Advances Value in Education (BRAVE) Group, Dudley-Javoroski S. Benchmarking in Academic Physical Therapy: A Multicenter Trial Using the PT-GQ Survey. *Physical Therapy*. Published online September 27, 2021;pzab229. doi:[10.1093/ptj/pzab229](https://doi.org/10.1093/ptj/pzab229)
13. **Mañago MM**, Swink LA, Hager ER, Gisbert R, Earhart GM, Christiansen CL, Schenkman M. The Impact of COVID-19 on Community-Based Exercise Classes for People with Parkinson Disease. *Physical Therapy*. 2021. doi:[10.1093/ptj/pzab203](https://doi.org/10.1093/ptj/pzab203)
14. **Mañago MM**, Kline PW, Harris-Love MO, Christiansen CL. The Validity of the Single-Leg Heel Raise Test in People With Multiple Sclerosis: A Cross-Sectional Study. *Front Neurol*. 2021;12:650297.
15. Canham LE, **Mañago MM**, Dannemiller L, Rapport MJ. Holistic Review in Doctor of Physical Therapy Admissions Can Lead to Enhanced Diversity in Admitted Students. *Journal of Physical Therapy Education*. 2021;35(3):195-202. ñ

16. Kline PW, Christiansen CL, Hager ER, Alvarez E, **Mañago MM**. Movement compensations during a step ascent task are associated with stair climbing performance in people with multiple sclerosis. *Gait & Posture*. 2021;87:27-32.
17. Maugeri G, D'Agata V, Roggio F, Cortis C, Fusco A, Foster C, **Mañago MM**, Harris-Love MO, Vleck V, Piancentini MF, Musumeci G.. The "Journal of Functional Morphology and Kinesiology" Journal Club Series: PhysioMechanics of Human Locomotion. *JFMK*. 2020;5(3):52.
18. **Mañago MM**, Kline PW, Alvarez E, Christiansen CL. Trunk and pelvis movement compensation in people with multiple sclerosis: Relationships to muscle function and gait performance outcomes. *Gait & Posture*. 2020;78:48-53.
19. **Mañago MM**, Callesen J, Dalgas U, Kittelson J, Schenkman M. Does disability level impact the relationship of muscle strength to walking performance in people with multiple sclerosis? a cross-sectional analysis. *Multiple Sclerosis and Related Disorders*. 2020;42:102052.
20. **Mañago MM**, Cameron M, Schenkman M. Association of the Dynamic Gait Index to fall history and muscle function in people with multiple sclerosis: A secondary data analysis. *Disability and Rehabilitation*. May 2019:1-6.
21. **Mañago MM**, Glick S, Hebert JR, Coote S, Schenkman M. Strength Training to Improve Gait in People with Multiple Sclerosis: A Critical Review of Exercise Parameters and Intervention Approaches. *International Journal of MS Care*. 2019;21(2):47-56.
22. **Mañago MM**, Hebert JR, Kittelson J, Schenkman M. Feasibility of a targeted strengthening program to improve gait in people with multiple sclerosis: a brief report. *Int J Rehabil Res*. 2018;41(4):364-367.
23. **Mañago MM**, Hebert JR, Kittelson J, Schenkman M. Contributions of Ankle, Knee, Hip, and Trunk Muscle Function to Gait Performance in People With Multiple Sclerosis: A Cross-Sectional Analysis. *Phys Ther*. 2018;98(7):595-604.
24. **Mañago MM**, Hebert JR, Schenkman M. Psychometric Properties of a Clinical Strength Assessment Protocol in People with Multiple Sclerosis. *International Journal of MS Care*. 2017;19(5):253-262.
25. Hebert JR, **Mañago MM**. Reliability and Validity of the Computerized Dynamic Posturography Sensory Organization Test in Persons with Multiple Sclerosis. *International Journal of MS Care*. 2017;19(3):151–157.
26. **Mañago MM**, Schenkman M, Berliner J, Hebert JR. Gaze stabilization and dynamic visual acuity in people with multiple sclerosis. *Journal of Vestibular Research*. 2016;26(5-6):469-477.
27. Ketelhut NB, Kindred JH, **Mañago MM**, Hebert JR, Rudroff T. Core muscle characteristics of patients with multiple sclerosis during walking. *Journal of Rehabilitation Research and Development*. 2015;52(6):713-724.

28. Hebert JR, Corboy J, Mañago MM, Schenkman M. Effects of vestibular rehabilitation on Multiple Sclerosis-related fatigue and upright postural control. *Physical Therapy*. 2011;91:1166-1183.

**Published Abstracts of Peer Reviewed Presentations:**

1. Diprinzio D, Swink L, Brown J, Novak D, Balfany K, Christiansen CL, Mañago MM. Exploring loneliness in people with Parkinson's disease participating in community exercise classes: A Program Evaluation [Poster]. American Physical Therapy Association Combined Sections Meeting. Boston, MA, 2024.
2. Hanlon SL, Mañago MM, Biondi EA, Hager ER, Christiansen CL. Measuring Gait Deviations During the Six-minute Walk Test in Patients with Multiple Sclerosis. American College of Sports Medicine Annual Meeting and World Congress [Poster]. Denver, CO; May 2023.
3. Chen V, Hildebrnad A, Mañago MM, Serdar A, Cameron MH. Validation of the Self-Assessed Dynamic Gait Index in People with Multiple Sclerosis. Consortium of Multiple Sclerosis Centers Annual Meeting [Poster]. Aurora, CO; June 2023
4. Swink LA, Thornton W, Nearing KA, Mañago MM. *Blood Flow Restriction in People with Advanced Multiple Sclerosis: "Now I Have a Sliver of Hope That I Might be Able to Build Some Strength."* Consortium of Multiple Sclerosis Centers Annual Meeting [Platform]. Aurora, CO; June 2023
5. Chen V, Hildebrnad A, Mañago MM, Serdar A, Cameron MH. Validation of the Self-Assessed Dynamic Gait Index in People with Multiple Sclerosis. Abstracts from the 12<sup>th</sup> Annual International Symposium of Gait and Balance in Multiple Sclerosis. *Mult Scler Rel Disord*. 2023
6. Boncella K, Mañago MM, Seamon BA, Wallin MT, Maloni H, Hoover B, Blackman MR, Harris-Love MH. Ultrasound Measures of Muscle Morphology in Multiple Sclerosis and its Relation to Patient Characteristics, Muscle Performance and Functional Mobility. Abstracts from the 12<sup>th</sup> Annual International Symposium of Gait and Balance in Multiple Sclerosis. *Mult Scler Rel Disord*. 2023
7. Thornton WA, Mañago MM, Tan AQ, Smith AC. Acute Intermittent Hypoxia and UE Strength and Function changes in Multiple Sclerosis: A Case Report. Gait Deviations Identified During the Six-Minute Walk Test Using Inertial Measurement Units in Patients with Multiple Sclerosis. Abstracts from the 12<sup>th</sup> Annual International Symposium of Gait and Balance in Multiple Sclerosis. *Mult Scler Rel Disord*. 2023
8. Hanlon SL, Mañago MM, Biondi EA, Hager E, Christiansen CL. Gait Deviations Identified During the Six-Minute Walk Test Using Inertial Measurement Units in Patients with Multiple Sclerosis. Abstracts from the 12<sup>th</sup> Annual International Symposium of Gait and Balance in Multiple Sclerosis. *Mult Scler Rel Disord*. 2023
9. Anderson CB, Fatone S, Mañago MM, Swink LA, Kittelson AJ, Magnussen DM, Christiansen, CL. *Development and Alpha Testing of a Patient Shared Decision Aid*

*for Prosthesis Design After Lower Limb Amputation.* [Platform presentation] International Society of Orthotists and Prosthetists, 19th World Congress. March 2023

10. Mañago MM, Cohen ET, Hager ER, Owens JG, Bade MJ. Feasibility of Low-Load Resistance Training with Blood Flow Restriction for People with Severe Multiple Sclerosis [Platform Presentation]. American Physical Therapy Association Combined Sections Meeting. San Diego, CA: 2023
11. Mañago MM, Palmer J, Kinney T, Canham L. Reliability of a holistic admissions rubric for an entry-level physical therapist program [Platform Presentation]. American Physical Therapy Association Combined Sections Meeting. San Diego, CA: 2023
12. Mañago MM, Kimbrell K, Hager ER, Dwight H, Bade MJ. Application and Perceptions of Blood Flow Restriction in People with Neurologic Conditions: A Practitioner Survey. Abstract from the American Physical Therapy Association Combined Sections Meeting. *Journal of Neurologic Physical Therapy.* 2022;46(1):51-53.
13. Dwight H, Hoffman R, Cohen ET, Owens J, Bade MJ, Mañago MM. Blood Flow Restriction for a Patient with Multiple Sclerosis and Advanced Disability: A Case Report. Abstract from the American Physical Therapy Association Combined Sections Meeting. *Journal of Neurologic Physical Therapy.* 2022;46(1):51-53.
14. Hoffman, RM, Christiansen, CL, Mañago MM. Responsiveness of the Patient-Specific Functional Scale to Changes in Walking Endurance: A Proof-of-Concept Analysis. Poster Abstracts from the 10th International Symposium on Gait and Balance in Multiple Sclerosis. *International Journal of MS Care.* 2021;23(1):45-46.
15. Mañago MM, Callesen J, Dalgas U, Kittelson J, Schenkman M. The impact of disability level on the relationship of muscle strength to walking capacity in people with multiple sclerosis. *Multiple Sclerosis Journal.* 2020;26(2S):15-16.
16. Mañago MM, Alvarez E, Kline P, Christiansen C. Proximal movement compensations are related to muscle function and walking capacity in people with multiple sclerosis. Poster abstract from the Consortium of Multiple Sclerosis Annual Meeting. *International Journal of MS Care.* 2020;22(2):74.
17. Kline PW, Christiansen CL, Hager ER, Mañago MM. Clinical Utility of the single-leg calf raise test in people with multiple sclerosis. Platform abstract from the American Physical Therapy Association Combined Sections Meeting. *Journal of Neurologic Physical Therapy.* 2020;44(1):104-5.
18. Kline PW, Christiansen CL, Hager ER, Mañago MM. Proximal frontal plane movement compensations during gait and step-ups in people with multiple sclerosis. Poster abstract from the Ninth International Symposium on Gait and Balance in Multiple Sclerosis. *International Journal of MS Care.* 2020;22(2):100-1.
19. Zaffarano B, Mañago M. Trigger point dry needling in a person with multiple sclerosis and functional mobility impairments: a case report. Poster abstract from the Ninth

International Symposium on Gait and Balance in Multiple Sclerosis. *International Journal of MS Care*. 2020;22(2):100-1.

20. Mañago MM, Hebert JR, Schenkman M. Strengthening of Ankle, Hip, and Trunk to Improve Gait in People with Multiple Sclerosis: a Feasibility Study. Poster Abstracts from the Eight International Symposium on Gait and Balance in Multiple Sclerosis. Sept 15, 2018. *Int J MS Care*. 2018; 20(6):298-299.
21. Mañago MM, Hebert JR, Schenkman M. The utility of handheld dynamometry and clinical strength assessments in people with multiple sclerosis. *JNPT*. 2017;41(1):75-88.
22. Mañago MM, Schenkman M, Hebert JR. Evaluating the Functional Capacity of the Vestibulo-Ocular Reflex in Persons with Multiple Sclerosis: Validity and Reliability of Computerized Testing. *Int J MS Care*. 2016; 18(6):312-313.
23. Lamb C, Mañago MM. Improvements in Strength, Walking, and Participation Following CoreAlign® Training for a person with Multiple Sclerosis. *JNPT*. 2016; 40(1):56.
24. Mañago MM, Hebert JR. Computerized sensory organization test as a measure of fall risk in people with Multiple Sclerosis. *JNPT*. 2016; 40(1):56.
25. Mañago MM, Hebert JR. Vestibular rehabilitation in a person with multiple sclerosis and sensation of motion at rest: A case report. *JNPT*. 2016; 40(1):56.
26. Mañago MM, Lamb C, Hebert JR. CoreAlign Training for a Person with Multiple Sclerosis: Effects on Strength, Walking, and Participation. *Arch Phys Med Rehabil*. 2015; 96(10):e1. DOI: 10.1016/j.apmr.2015.08.292
27. Mañago MM, Hebert JR. Concurrent validity of the Patient-Specific Functional Scale and Timed 25 Foot Walk Test in people with multiple sclerosis. Poster Abstracts from the Third International Symposium on Gait and Balance in Multiple Sclerosis. *Int J MS Care*. 2013; 15(4):179-180.
28. Hebert JR, Corboy JR, Mañago MM, Schenkman M. Effects of Vestibular Rehabilitation on Multiple Sclerosis-Related Fatigue and Upright Postural Control: A Randomized Controlled Trial. Poster Abstracts from the First International Symposium on Gait and Balance in Multiple Sclerosis: Gait and Balance as Biomarkers in MS. Oregon Health & Science University, Portland, OR. Oct 1, 2011. *Int J MS Care*. 2011; 13(4):199-204.

**Peer Reviewed Scientific and Professional Presentations (not previously cited above under abstracts):**

1. Van Valkenburgh L, Mañago MM. Association of bladder/bowel disability scores with hip and trunk strength in individuals with multiple sclerosis: Baseline analysis of a prospective cohort study [Poster]. University of Colorado Health Rehabilitation Symposium. Aurora, CO, 2024
2. Kiernan L, Borbas V, Will R, Van Valkenburgh L, Strahler T, Christiansen C, Mañago MM. Blood Flow Restriction and Veterans with Advanced Multiple Sclerosis (BRaVe-

MS): a Randomized Controlled Trial Protocol. Eastern Colorado Health Care System VA Research Day 2023 [Poster], Aurora, CO. September 28, 2023

3. Anderson CB, Fatone S, Mañago MM, Swink LA , Kittelson AJ, Magnussen DM, Christiansen, CL. *Development and Alpha Testing of a Patient Shared Decision Aid for Prosthesis Design After Lower Limb Amputation*. [platform presentation] International Society of Orthotists and Prosthetists, 19th World Congress. Anticipated: March 2023
4. Hinrichs L, Rodriguez J, Nordon-Craft A, **Mañago M**, McDevitt A, Judd D. Blocked scheduling in Physical Therapist education as a curricular adjustment in response to COVID-19 [poster presentation] American Physical Therapy Association Combined Sections Meeting. San Antonio, TX: 2022.
5. Duncan R, **Mañago MM**. Pain in Neurodegenerative Disease: Why We Should Pay Attention [Education Session]. Academy of Neurologic Physical Therapy Conference [Virtual], Oct 2021.
6. **Mañago MM**, Swink LA, Hager ER, Gisbert R, Earhart GM, Christiansen CI, Schenkman M. Community-based exercise class participation for people with Parkinson's disease and their class instructors during COVID-19. Academy of Neurologic Physical Therapy Conference [Virtual], Oct 2021.
7. Hoffman, RM, Christiansen, CL, **Mañago MM**. Psychosocial Aspects of Perceived Fatigue are Associated with Mobility Outcomes in People Multiple Sclerosis [Poster]. Academy of Neurologic Physical Therapy Conference [Virtual], Oct 2021.
8. Swink, LA, Schenkman M, Christiansen CL, Hager ER, Earhart GM, Gisbert R, **Mañago MM**. Exercise patterns in a virtual world: Barriers and needs for people with Parkinson's disease during the COVID-19 pandemic [Poster]. Occupational Therapy Summit of Scholars, June 2021.
9. Kline PW, Christiansen CL, Hager ER, **Mañago MM**. Compensations during step ascent contribute to stair climbing ability in multiple sclerosis [Poster]. American Society of Biomechanics Annual Meeting, Aug 2020.
10. Canham L, Dannemiller L, **Mañago M**, Rapport MJ. Using a Holistic Review in Admissions: One Programs' Experience in Enhancing Diversity. [Platform] American Physical Therapy Association Combined Sections Meeting. Denver, CO, Feb 2020.
11. Ott J, **Mañago M**. Balance, falls, and patient reported outcomes before and after deep brain stimulation in Parkinson's disease: A pilot study. [Poster Presentation] American Physical Therapy Association Combined Sections Meeting. Denver, CO, Feb 2020.
12. **Mañago M**. New Insights into Muscle Function for Gait in People with Multiple Sclerosis. American Physical Therapy Association NEXT Meeting [Educational Session]. Chicago, IL. June 12-15, 2019.



13. Mañago M. Coote S, Hebert JR, Schenkman M. A Critical Review of Strength Training to Improve Gait in People with Multiple Sclerosis: Exercise Parameters and Intervention Approaches [Platform]. World Congress of Physical Therapy. Geneva, Switzerland. May 10-13, 2019.
14. Mañago M. Herbert, JR. Clinical Management of Gait and Balance in multiple sclerosis: Applying the Evidence. Colorado Physical Therapy Association Fall Conference [Educational Session]. Black Hawk, CO; October 2016.
15. Glick S, Mañago MM. Improvements in mobility and employment in an adult with fascioscapulohumeral muscular dystrophy (FSHD) following a femur fracture: A case report. [Poster Presentation] American Physical Therapy Association Colorado Spring Conference. Keystone, CO, Apr 15-17, 2016.
16. Mañago MM. Fatigue in multiple sclerosis: implications on practice and management. [Symposium] Part of: The effects of fatigue on function and pathology: a cross-disciplinary view. American Physical Therapy Association Combined Sections Meeting. Anaheim, CA. Feb 19, 2016.
17. Hebert, J, Mañago. M. Multiple sclerosis: Clinical management of gait, balance and related problems [Educational Session]. Nebraska Physical Therapy Association Spring Conference. North Platte, NE; April 2014.
18. Mañago MM. Leibold, MR; Backstrom, KM. Evaluating Clinical Outcomes and Meaningful Change: An Example Using the Neck Disability Index [Poster Presentation]. First Annual Performance Excellence Summit. University of Colorado Hospital, Aurora, CO. November 11, 2014.
19. Mañago. M. The patient with Parkinson's Disease: Evidence based evaluation and treatment [Educational Session]. Centennial Area Health Education Center. University of Colorado Denver Health Sciences Center. Aurora, CO; March 2008

#### **Other Publications:**

1. **Mañago MM.** Gisbert R. Kahlo and Beyond: The Importance of Art and Medical Humanities in Physical Therapy [Commentary]. *Phys Ther.* 2017;97(11):1114. doi:10.1093/ptj/pzx084.

#### **Other Invited Presentations:**

1. Mañago. MM. Shah S. Ask an MS Expert: Preventing Falls for Veterans with MS. National MS Society Ask an MS Expert Series [Virtual]; March 2024.
2. **Mañago MM.** Blood Flow Restriction in people with multiple sclerosis [Educational Session]. Consortium of MS Centers Annual Meeting; Aurora, CO; June 2023.
3. **Mañago MM.** Blood Flow Restriction training for people with multiple sclerosis [Lecture]. Oregon Health Science Center Neurology Grand Rounds; Portland, OR; Sept 2023.

4. Mañago, MM. Blood Flow Restriction Training in People with Advanced Parkinson's Disease. Davis Phinney Foundation Leadership Circle [Virtual]; 2023
5. Mañago, MM. Understanding and Addressing Mobility Challenges in MS. Rocky Mountain MS Center Fall Education Summit. Aurora, CO; 2023
6. **Mañago M.** Integrating clinical and biomechanical insights to improve strength training in people with multiple sclerosis [Keynote Lecture]. Rocky Mountain American Society of Biomechanics, Estes Park, CO, April 9, 2022.
7. **Mañago M,** Cameron M. Research in the VA Environment: Career Development Awards & Mentoring. Multiple Sclerosis Centers of Excellence (MSCoE) West Regional Meeting [Virtual]. June 25, 2021.
8. **Mañago M.** Staying active with multiple sclerosis: Physical therapy and beyond. Rocky Mountain MS Center Empower Lecture Series [Virtual]. Rocky Mountain MS Center. Denver, CO; December 18, 2020.
9. **Mañago M.** Ask the Experts ALS Panel. ALS Association Experts Symposium. Denver, CO; October 11, 2020.
10. **Mañago M.** Rehabilitation for Fatigue in People with Multiple Sclerosis. 10<sup>th</sup> International Symposium on Gait and Balance Patient Seminar [Virtual]. National Multiple Sclerosis Society. Denver, CO; October 2<sup>th</sup>, 2020.
11. **Mañago M.** Proximal Movement Compensations During Walking in People with Multiple Sclerosis. 33<sup>rd</sup> Annual Gersten Day Scientific Symposium. University of Colorado Anschutz Medical Campus. Aurora, CO; June 12, 2020.
12. **Mañago M.** Clinical Mobility Measurement. Invited Guest Lecturer, Colorado State University HES 704B: Advanced Topics in Bioenergetics: Mobility Impairment and Exercise Interventions in Clinical Populations. Jan 29, 2020.
13. **Mañago M.** Using Technology for Monitoring Mobility in Persons with Multiple Sclerosis: How, What, and Why. 9<sup>th</sup> International Symposium on Gait and Balance Patient Seminar. National Multiple Sclerosis Society. Denver, CO; October 4<sup>th</sup>, 2019.
14. Manago M. Physical Therapist Management of Charcot Marie Tooth's Disease, Fascio-Scapular Humeral Muscular Dystrophy, and Inclusion Body Myositis. University of Colorado Department of Neurology Neuromuscular Symposium. University of Colorado Anschutz Medical Campus. Aurora, CO; September 28, 2019.
15. Manago M. Physical Therapist Management in Fascio-Scapular Humeral Muscular Dystrophy. World FSHD Day Colorado Chapter Meeting. University of Colorado Anschutz Medical Campus. Aurora, CO; June 20<sup>th</sup>, 2019.
16. Manago M. Targeted Strength Training to Improve Gait in People with Multiple Sclerosis. Aarhus University, Department of Public Health, Section of Sport Science. Aarhus, Denmark. May 29<sup>th</sup>, 2019.

17. Mañago M. Physical Therapy Management in Amyotrophic Lateral Sclerosis. Muscular Dystrophy Association ALS Summit. University of Colorado Hospital. Aurora, CO; November 4<sup>th</sup>, 2017.
18. Mañago, M. Jordan, S. Sawyer, E. Are you Up to Date on Electrotherapy and Other Modalities? Evidence and Clinical Decision Making: Choosing Wisely. University of Colorado Denver Physical Therapy Program Clinical Instructor Update Series. Aurora, CO; June 2017.
19. Mañago, M. Exercise in Multiple Sclerosis. Rocky Mountain Multiple Sclerosis Center Spring Educational Summit. Denver, CO; May 2015.
20. Mañago, M. Physical Therapy for Stroke Survivors: A Lifelong Journey [annual seminar lecture]. National Stroke Association Life-long Education and Advocacy Program (LEAP) for Stroke Survivors. University of Colorado Hospital. Aurora, CO; October 2009, October 2010, September 2011, October 2012, May 2014.
21. Mañago M. Concurrent validity of the Patient-Specific Functional Scale and the Timed 25-foot Walk in people with multiple sclerosis. 15<sup>th</sup> Annual Rehabilitation Forum. University of Colorado Hospital. Aurora, CO; September 2013.
22. Mañago, M. Supportive Services in Neuromuscular Disorders. Neurology Grand Rounds, University of Colorado Denver School of Medicine. Aurora, CO; September 2013.
23. Mañago, M. Physical Therapy and Stroke Rehabilitation [lecture]. Family Medicine Resident Program, University of Colorado Denver Health Sciences Center. Aurora, CO. 2012.
24. Mañago, M. Exercise and Inclusion Body Myositis [lecture]. Inclusion Body Myositis Support Group. Swedish Hospital. Denver, CO; June 2012, November 2013.
25. Mañago, M. Mobility Assessment and Funding [lecture]. Muscular Dystrophy Association ALS Symposium. Denver, CO; May 2011.
26. Mañago, M. Vestibular Rehabilitation: Physical Therapy Clinical Decision Making and Intervention [lecture]. Audiology Doctoral Program. University of Colorado Denver Audiology Program. Aurora, CO; April 2011, November 2012, October 2014.
27. Mañago, M. Ankle Foot Orthotics: Clinical Practice and Evidence [lecture]. Resident Program, Rehabilitation Medicine, University of Colorado Denver Health Sciences Center. Aurora, CO; Feb 2012.
28. Mañago, M. Vertebral Artery Syndrome [lecture]. Professional Advancement Lecture Series. University of Colorado Hospital. Aurora, CO; May 2011.
29. Mañago M. Deep Vein Thrombosis: Evidenced Based Management for Physical Therapists [ lecture]. 12<sup>th</sup> Annual Rehabilitation Education Forum, University of Colorado Hospital. Aurora, CO; September 2010.

30. Mañago, M. Assistive Devices and Orthotics [lecture]. Neuromuscular Fellowship Program, Department of Neurology, University of Colorado Denver Health Sciences Center. Aurora, CO; June 2010.
31. Mañago, M. Physical Therapy Interventions and Stroke Rehabilitation [annual seminar lecture]. Resident Program, Rehabilitation Medicine, University of Colorado Denver Health Sciences Center. Aurora, CO. 2009-2015.

## **GRANT SUPPORT**

### **Current Grant Support**

**Grant:** Paralyzed Veterans of America Education Foundation Grant

**Funding Agency:** Paralyzed Veterans of America Education Foundation

**Title:** *14th International Symposium on Gait and Balance in Multiple Sclerosis*

**Role:** Principal Investigator

**Funding and Effort:** \$19,911 total award; 1% effort

**Dates:** 06/01/24-05/31/25

**Description:** This grant will provide partial support for an annual 1 ½ day multidisciplinary educational meeting focused on gait and balance in multiple sclerosis.

**Grant:** IK2 RX004242-01

**Funding Agency:** Veteran's Affairs Career Development Award-2 (VA CDA-2)

**Title:** *Low-Load Resistance Training with Blood Flow Restriction in People with Multiple Sclerosis and Advanced Disability: A Randomized Control Trial*

**Role:** Principal Investigator

**Effort and Funding:** \$802,049 total award; 62.5% effort

**Dates:** 01/03/23-12/31/28

**Description:** The goal of this project is to determine the efficacy of low-load resistance training using blood flow restriction on muscle strength and morphology in people with MS and more advanced disability. This award also supports time to produce additional scholarly work.

**Grant:** Davis Phinney Foundation Award

**Funding Agency:** Davis Phinney Foundation

**Title:** *Feasibility of low-load resistance training with blood flow restriction in people with advanced disability due to Parkinson's disease*

**Role:** Principal Investigator

**Effort and Funding:** \$99,121 total award; 10% effort

**Dates:** 04/01/23-06/30/24

**Description:** The goal of this project is to determine the feasibility of low-load resistance training using blood flow restriction in people with PD and more advanced disability.

**Grant:** National MS Society Mentor Based Postdoctoral Fellowships MB-2205-39515

**Funding Agency:** National Multiple Sclerosis Society

**Title:** *From bench to bedside - mobility control and neurorehabilitation in people with multiple sclerosis*

**Role:** Co-Mentor (PI: Fling)

**Funding and Effort:** \$497,901 total award

**Dates:** 7/1/2023-6/30/2028

**Description:** This award provides multi-year support for a mentor-institution combination to train young clinician scientists to conduct MS-specific rehabilitation research.

**Grant:** 1U01NS113851

**Funding Agency:** NIH/NINDS

**Title:** *Study in Parkinson disease of exercise Phase III clinical trial: SPARX3*

**Role:** Outcomes Assessor (PI: Corcos)

**Funding and Effort:** \$90,118 annual total site award, 5% effort

**Dates:** 9/25/19-07/31/24

**Description:** The study goal is to establish the efficacy of high-intensity endurance exercise as first-line therapy for recently diagnosed people with Parkinson's disease (PD).

### Completed Grant Support

**Grant:** Consortium of Multiple Sclerosis Centers Pilot Award

**Funding Agency:** Consortium of Multiple Sclerosis Centers Pilot Award

**Title:** *Feasibility of low-load resistance training using blood flow restriction for people with multiple sclerosis and marked mobility restriction*

**Role:** Principal Investigator

**Funding and Effort:** \$40,000 total award; 15% effort

**Dates:** 03/01/2021-8/31/22

**Description:** The objectives of this study are to determine feasibility and limited efficacy of a resistance training intervention targeting proximal muscles on walking function, movement patterns, and activity behaviors in people with MS.

**Grant:** K12 HD055931

**Funding Agency:** NIH

**Title:** *Proximal resistance training to improve walking capacity and physical activity in people with multiple sclerosis*

**Role:** Scholar, Mentored Principal Investigator (PI: Harris-Hayes)

**Funding and Effort:** \$284,000 total award; 75% effort

**Dates:** 09/01/2020-10/31/22

**Description:** The objectives of this study are to determine feasibility and limited efficacy of a resistance training intervention targeting proximal muscles on walking function, movement patterns, and activity behaviors in people with MS. This award also supported time used to produce additional scholarly work.

**Grant:** Paralyzed Veterans of America Education Foundation Grant

**Funding Agency:** Paralyzed Veterans of America Education Foundation

**Title:** *10th International Symposium on Gait and Balance in Multiple Sclerosis*

**Role:** Principal Investigator

**Funding and Effort:** \$15,000 total award; 1% effort

**Dates:** 06/01/19-05/31/20

**Description:** This grant provided partial support for an annual 1 ½ day multidisciplinary educational meeting focused on gait and balance in multiple sclerosis.

**Grant:** University of Colorado PM&R Pilot Award

**Funding Agency:** University of Colorado

**Title:** *Instrumented Motion Analysis of Hip and Trunk Movement Compensations for People with Multiple Sclerosis*

**Role:** Principal Investigator

**Funding and Effort:** \$10,000 total award

**Dates:** 09/1/18-08/31/19

**Description:** The goal of this project is to evaluate hip and trunk biomechanical compensatory strategies during functional activities in patients with multiple sclerosis.

**Other Research Activity:**

Outcome assessor (2018-2019). A Phase 2 Randomized, Double-Blind, Placebo-Controlled Study of ACE-083 in Patients with Facioscapulohumeral Muscular Dystrophy

Outcome assessor (2018-2019). A Phase 2 Randomized, Double-Blind, Placebo-Controlled Study of ACE-083 in Patients with Charcot-Marie-Tooth Disease Types I and X

Data Collection and Site Coordinator. Baert I, Smedal T, Kalron A, et al. Responsiveness and meaningful improvement of mobility measures following MS rehabilitation. *Neurology*. October 2018;10.1212/WNL.0000000000006532.

Outcome assessor. A Phase 2, Double-Blind, Randomized, Placebo-Controlled, Multiple Dose Study of CK-2127107 in Two Ascending Cohorts of Patients with Spinal Muscular Atrophy (SMA). 2017.

Treating physical therapist. Stevens-Lapsley JE, Balter JE, Wolfe P, Eckhoff DG, Kohrt WM. Early Neuromuscular Electrical Stimulation to Improve Quadriceps Muscle Strength After Total Knee Arthroplasty: A Randomized Controlled Trial. *Phys Ther*. 2011;92: Nov 17.

**Continuing Education and Workshops:**

Moderator and Presenter. ECHO MS: National Multiple Sclerosis Society Extension for Community Healthcare Outcomes, Mountain Hub. September 2022 – March 2023.

Site Coordinator. Expanding Neurologic Expertise: Advanced Practice in Vestibular Physical Therapy. Neurology Section, American Physical Therapy Association. University of Colorado Denver Health Sciences Center. Aurora, CO; September 2011.

Submission Reviewer & Moderator. Annual Rehabilitation Education Forum, University of Colorado Hospital. Aurora, CO; September 2007-Present.

**Membership in Scientific/Professional Organizations:**

American Physical Therapy Association 2003-present  
*Colorado Chapter, Neurology Section, Research Section, Education Section*

Health Volunteers Overseas 2010-2016  
*Allied Healthcare Providers Section*

Consortium of Multiple Sclerosis Centers 2017-present  
*Healthcare Providers Section*

**Consultative and Advisory Positions Held:**

Member

Benchmarking Research Advances Value in Education (BRAVE) Group  
2019-Present

Organizing committee member

International Symposium on Gait and Balance in Multiple Sclerosis [Annual Meeting].  
2019- Present (Currently Chair).

Grant/ Scientific Reviewer:

MS Research Australia (2020)  
Panel Member, Congressionally Directed Medical Research Programs (CDMRP),  
Multiple Sclerosis Research Program (MSRP) (2020)  
Reviewer, AB Nexus Research Collaboration Grant Program (2023)  
Reviewer, United Kingdom Multiple Sclerosis Society, Doctoral Training Centre in  
Symptom Management Award (2023)  
Reviewer, Health Research Board of Ireland, Emerging Investigators Awards (2024)

Advisory Board Member (2018-present).

*Comparative Effectiveness of an Exercise Intervention Delivered via Telerehabilitation  
and Conventional Mode of Delivery, PCORI.*

Journal Reviewer:

**Ad Hoc Peer-Review Journal Reviewer**

PLOS One	2017-Present
Multiple Sclerosis and Related Disorders	2018-Present
Journal of Clinical Medicine	2018-Present
Restorative Neurology and Neuroscience	2018-Present
Medicine and Science in Sport	2018-Present
Physiotherapy Theory and Practice	2019-Present
Journal of Neurologic Physical Therapy	2019-Present
Experimental Gerontology	2019-Present
The Journal of Head Trauma Rehabilitation	2019-Present
Physical Therapy	2020-Present
Gait and Posture	2020-Present
Annals of Translational Medicine	2020-Present
International Journal of MS Care	2020-Present
Journal of Vestibular Research	2021-Present
Multiple Sclerosis Journal	2021-Present
Archives of Physical Medicine and Rehabilitation	2021-Present
Frontiers of Rehabilitation Science	2022-Present
Parkinsonism and Related Disorders	2022-Present
Physiotherapy Canada	2023-Present
Contemporary Clinical Trials Communications	2023-Present
Journal of Neurological Sciences	2023-Present

**Student Mentoring**

**Academic Advisor to DPT Students**

1. Lisa Bauer (2016-2018)
2. Rebecca Gabler (2016-2018)
3. Kaylae Nakamura (2016-2018)
4. Connie Farrow (2017-2019)

5. Shiyang Fu (2017-2019)
6. Christina Hunt (2018-2020)
7. Ondre Smith (2018-2020)
8. Carrie Elbogen (2019-2021)
9. Marissa Holliday (2019-2021)
10. Seven Ngo (2019-2021)
11. Madison Duffy (2020-2022)
12. Isabel Marbaker (2020-2022)
13. Garciela Salinas (2020-2022)\*
14. Kristen Kirby (2021-2023)
15. Alyssa Siljendahl (2021-2023)
16. Zachary Shrout (2021-2023)
17. Hanna Barritt (2022-Present)
18. Nicole Levar (2022-Present)
19. Justin Lewis (2022-Present)
20. Ashlee Workman (2022-Present)
21. Elizabeth Hunt (2023-Present)
22. David Standerfer (2023-Present)
23. Natalie Telep (2023-Present)

#### **Faculty Mentor**

1. Elliot (EJ) Gann, DPT (2023-Present)\* \*\*
2. Alex Garbin, DPT, PhD (2023-Present)
3. Talia Strahler, DPT (2021-Present)\* \*\*
4. Robert Will, DPT (2022-Present)\* \*\*
5. Hannah Dwight, DPT (2021-2022)\* \*\*

#### **Research Mentor to PhD students**

1. Chelsey Anderson (2018–2022); Role: Dissertation Committee\* \*\*
2. Andrew Hagen (2022 -Present); Role: Dissertation Committee (Colorado State University)
3. Wesley Thornton (2023-Present); Role: Dissertation Committee Chair \* \*\*
4. Lauren Van Valkenburgh (2023-Present); Role: Primary Mentor \* \*\*

#### **Research Mentor to Post-Doctoral Fellow**

1. Kristin Johnson, DPT, PHD (2023-Present); Role: Co-Mentor

#### **Research Mentor to Master's students**

1. Arianna Odom (2018-2019)  
Role: Dissertation Committee (Colorado State University)

#### **Mentor to Physical Therapy Residents**

1. Nicole Schremp, DPT, Pediatric Resident CU PT (2019-2020)
2. Carissa Wengrovius, DPT, PhD, Faculty Resident CU PT (2022-2023)

#### **Mentor to Clinicians**

1. Renee Peter (King), DPT (2011-2013)
2. Stephanie Glick, DPT (2014-2015)\* \*\*
3. Jane Ott, DPT (2016-2019)\*
4. Bryce Zaffarano, DPT (2019-2020)\*
5. Dominic Diprinzio, DPT (2023-Present)\*



\*Presented work at national conference

\*\*Co-author on a manuscript

**Services to the University/College/School on Committees/Councils/Commissions:**

Member, Recruitment and Admissions Committee, University of Colorado Denver Physical Therapy Program. 2018-Present

Member, Assessment Committee, University of Colorado Denver Physical Therapy Program. 2019-Present

Chair, Hidden Curriculum Task Force. University of Colorado Denver Physical Therapy Program. 2018-Present.

Chair, Student Debt Task Force. University of Colorado Denver Physical Therapy Program. 2018-2019.

Facilitator, Hidden Curriculum. University of Colorado School of Medicine. 2018-2019

Facilitator, Clinical Reasoning Through Art. University of Colorado School of Medicine. 2018

Member, Writing Task Force. University of Colorado Denver Physical Therapy Program. Fall 2016 – 2017.

Chair, University of Colorado Hospital Education Committee. Oversaw coordination of an interdisciplinary, peer-reviewed, bi-annual education forum. 2012, 2014.

Member, University of Colorado Hospital Education Committee. 2007-Present.

**Honors and Awards:**

Top Poster, Degenerative Disease Special Interest Group, American Physical Therapy Association Combined Sections Meeting, 2024

Top Platform, Degenerative Disease Special Interest Group, American Physical Therapy Association Combined Sections Meeting, 2023

The Labe C Scheinberg Award for the Best Work in Neurorehabilitation, Consortium of MS Centers Annual Meeting, 2023

Best Clinical Research Poster, Degenerative Disease Special Interest Group, Neurology Section, Academy of Neurologic Physical Therapy Conference [Virtual], 2021.

Top Platform, Degenerative Disease Special Interest Group, Neurology Section, American Physical Therapy Association Combined Sections Meeting, Denver, CO, 2020.

Top abstract by a trainee, Eighth International Symposium on Gait and Balance in Multiple Sclerosis: Sensory Contributions to Gait and Balance. Oregon Health & Science University, Portland, OR. 2018.

President's Fund for the Humanities Award, Office of Academic Affairs, University of Colorado.

Herndon Award for Outstanding Article in the *International Journal of MS Care*. Recognizes the best article published in the journal, 2017.

Top abstract by a trainee, Sixth International Symposium on Gait and Balance in Multiple Sclerosis: Sensory Contributions to Gait and Balance. Oregon Health & Science University, Portland, OR. Sept 9-10, 2016.

Chancellor Diversity Scholarship, School of Medicine, University of Colorado Denver Health Sciences Center, 2004.

**Community Service:**

Volunteer, 9News Health Fair. Provided free posture and balance screenings at local community health fair; oversaw physical therapy students performing same screenings. Denver, CO. 2016- present.

Language Interpreter and Program Guide, Clinical Education Experience in Nicaragua. Physical Therapy Program, University of Colorado Denver Health Sciences Center. Health Volunteers Overseas, Nicaragua, January 2010, 2013, 2016

**Continuing Education Attended:**

APTA Combined Sections Meeting. Denver, CO. February, 2020.

9<sup>th</sup> International Symposium on Gait and Balance in Multiple Sclerosis. Oregon Health Science Center. Denver, CO. 2019

APTA NEXT. Chicago, IL. June 2019.

World Congress of Physical Therapy. Geneva, Switzerland. May 2019.

8<sup>th</sup> International Symposium on Gait and Balance in Multiple Sclerosis. Oregon Health Science Center. Portland, OR. 2018

APTA Combined Sections Meeting. San Antonio, TX. February 2017.

6<sup>th</sup> International Symposium on Gait and Balance in Multiple Sclerosis. Oregon Health Science Center. Portland, OR. September 2016

APTA Combined Sections Meeting. Anaheim, CA. February 2016.

3<sup>rd</sup> International Symposium on Gait and Balance in Multiple Sclerosis. Saint Louis University. St. Louis, MO. October 2013.

2<sup>nd</sup> International Symposium on Gait and Balance in Multiple Sclerosis: Interventions for Gait and Balance in MS. Sponsored by MS Center of Oregon, Oregon Health Science Center Department of Neurology, MS Center of Excellence-West, Portland VA Medical Center and the Oregon Health Science Center Brain Institute. Portland, OR. October 2012.

APTA/ Colorado Chapter Fall Convention. Sponsored by APTA/ Colorado Chapter and University of Colorado Denver Health Sciences Center. Aurora, CO; November 2011.

Expanding Neurologic Expertise: Advanced Practice in Vestibular Physical Therapy. Sponsored by Neurology Section, American Physical Therapy Association. University of Colorado Denver Health Sciences Center. Aurora, CO; September 2011

Advanced Credentialed Clinical Instructor. Sponsored by American Physical Therapy Association and University of Colorado Denver Health Sciences Center. Aurora, CO; May 2011.

**Current Teaching Responsibilities in the Entry-level Physical Therapy Program:**

Fall 1 (Semester 2):

DPTR 5621 Evidence Based Practice, **Course Coordinator**

Spring 1 (Semester 3):

DPTR 5631: Clinical Reasoning I, Instructor

Fall 2 (Semester 5)

DPTR 6632 Clinical Reasoning II, Instructor

Spring 2 (Semester 6)

DPTR 6633: Clinical Reasoning III, Instructor