

# JASON R. FRANZ

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## EDUCATION

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**Post-Doc**, Mechanical Engineering, 2/2013-6/2015  
University of Wisconsin-Madison  
Advisor: Darryl Thelen, Ph.D.

**Ph.D., Integrative Physiology**, 12/2012  
University of Colorado Boulder  
Advisor: Rodger Kram, Ph.D.

**M.S., Engineering Mechanics** (*Biomechanics Emphasis*), 5/2006  
Virginia Polytechnic Institute and State University  
Advisor: Kevin P. Granata, Ph.D.

**B.S., Engineering Science and Mechanics** (*Biomechanics Option, Math Minor*), 5/2004  
Virginia Polytechnic Institute and State University

## POSITIONS

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**Associate Professor** 7/2020 - Present  
Joint Dept. of Biomedical Engineering  
University of North Carolina at Chapel Hill  
North Carolina State University

**Director** 7/2015 - Present  
Applied Biomechanics Laboratory  
University of North Carolina at Chapel Hill

**Faculty Affiliate** 9/2015 - Present  
Human Movement Science Program  
University of North Carolina at Chapel Hill

**Affiliate Member** 2/2021 - Present  
Thurston Arthritis Research Center  
University of North Carolina at Chapel Hill

**Faculty Fellow** 11/2021 - Present  
Carolina Center for Population Aging and Health  
University of North Carolina at Chapel Hill

**Founder & Chief Technology Officer** 1/2023 - Present  
VETTA Solutions, Inc.

**Assistant Professor** 7/2015 - 6/2020  
Joint Dept. of Biomedical Engineering  
University of North Carolina at Chapel Hill  
North Carolina State University

**Post-Doctoral Fellow** 2/2013 - 6/2015  
Neuromuscular Biomechanics Laboratory  
Dept. of Mechanical Engineering, University of Wisconsin Madison

<b>Graduate Research Assistant</b> Locomotion Laboratory, Dept. of Integrative Physiology University of Colorado Boulder	8/2009 - 1/2013
<b>Biomechanics Consultant</b> Footwear Biomechanics Laboratory Brooks Sports, Inc.	2/2007 - 6/2009
<b>Biomechanics Research Engineer</b> Dept. of Physical Medicine and Rehabilitation University of Virginia, PI: D. Casey Kerrigan, M.D.	5/2006 - 6/2009
<b>Graduate Research Assistant</b> Dept. of Engineering Mechanics Virginia Polytechnic Institute and State University	8/2003 - 5/2006

## PUBLICATIONS

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### Manuscripts in review:

Eichenlaub EK, Gelinne A, Bhowmick D, **Franz JR**. The effects of cervical spine posture on susceptibility to walking balance perturbations. *Gait & Posture*.

Gray AJ, Adamczyk P, **Franz JR**. The effects of age and task demand on dynamic mean ankle moment during walking. *Gait & Posture*.

Bjornsen E, Berkoff D, Blackburn T, Davis-Wilson H, Evans-Pickett A, **Franz JR**, Harkey M, Horton WZ, Lisee C, Luc-Harkey B, Munsch A, Nissman D, Pfeiffer S, Pietrosimone B. A ground reaction force phenotype common to individuals at high-risk for and those with knee osteoarthritis. *Osteoarthritis and Cartilage*.

Pimentel R, Kiefer AW, **Franz JR**. Increasing Kinematic Keypoint Fidelity Improves Estimates of Walking Metabolic Cost. *Journal of Applied Biomechanics* (In revision)

Shelton A, McTaggart E, Allen J, Mercer V, **Franz JR**. Do stepping response times generalize between gait initiation and walking? *Journal of Biomechanics*.

Funk CJ, Krupenevich RL, Sawicki GS, **Franz JR**. Exploring the Functional Boundaries and Metabolic Consequences of Triceps Surae Force-Length Relations during Walking. *Journal of Biomechanics*. (2021 ASB Journal of Biomechanics Award Paper) (In revision).

Armitano-Lago C, Evans-Pickett A, Davis-Wilson H, Munsch A, Longobardi L, Willcockson H, Schwartz TA, **Franz JR**, Pietrosimone B. Modifying loading during gait leads to biochemical changes in serum cartilage oligomeric matrix protein concentrations in ACL reconstructed persons. *European Journal of Applied Physiology*.

Ellie OS, **Franz JR**, Selgrade BP. The Effects of Optical Flow Perturbations on Standing Balance in People with Multiple Sclerosis. *Journal of Applied Biomechanics* (In revision).

Davis-Wilson HC, Thoma LM, **Franz JR**, Blackburn JT, Longobardi L, Schwartz TA, Hackney AC, Pietrosimone B. Physical Activity Associates with T1rho MRI of Femoral Cartilage Following Anterior Cruciate Ligament Reconstruction. *Medicine & Science in Sports and Exercise* (In revision).

Cain MS, Song K, Pietrosimone B, Blackburn JT, **Franz JR**, Migel K, Jang J, Lin F, Wikstrom E. Plantar Massage but not Ankle Mobilization Reduces Visual Reliance in those with Chronic Ankle Instability: A Randomized Controlled Trial. *Journal of Athletic Training*.

Buck AN, Lisee CM, Bjornsen ES, Schwartz TA, Spang JT, **Franz JR**, Blackburn JT, Pietrosimone BG. Biomechanical Thresholds for Identifying Posttraumatic Osteoarthritis-Related Symptoms Six Months Following Anterior Cruciate Ligament Reconstruction, *Journal of Orthopaedic Research*.

Kwon Y, Chilton LK, Kim H, **Franz JR**. The effect of prolonged walking on leg muscle activity patterns and vulnerability to perturbations. *Journal of Electromyography and Kinesiology*.

Shelton AD, McTaggart EM, Allen JL, Mercer VS, Crenshaw JR, **Franz JR**. Does vulnerability to walking balance perturbations generalize across contexts? *Human Movement Science*.

Pimentel RE, Sawicki G, **Franz JR**. Simulations suggest walking with reduced propulsive force would not mitigate the energetic consequences of lower tendon stiffness. *PLOS One* (<https://biorxiv.org/cgi/content/short/2023.03.03.530931v1>) (In revision).

#### Peer-Reviewed Publications:

Cone SG, Kim H, Thelen DG, **Franz JR**. 3D characterization of the triple-bundle Achilles tendon from in vivo high-field MRI. *Journal of Orthopaedic Research* (In press).

Lisee C, Evans-Pickett A, Davis-Wilson H, Longobardi L, Lalush D, **Franz JR**, Munsch AE, Pietrosimone B. Delayed changes in biochemical biomarkers in response to loading are associated with lateral femoral cartilage T1p Post-ACLR. *Eur J Appl Phys* (In Press).

Bjornsen E, Davis-Wilson H, Evans-Pickett A, Horton WZ, Lisee C, Munsch AE, Nissman D, Blackburn JT, **Franz JR**, Pietrosimone B. Knee Kinetics and the Medial Femoral Cartilage Cross-Sectional Area Response to Loading in Individuals with Anterior Cruciate Ligament Reconstruction. *Clinical Biomechanics* (In press).

Eichenlaub EK, Duque Urrego D, Sapovadia S, Allen J, Mercer VS, Crenshaw JR, **Franz JR**. Susceptibility to walking balance perturbations in young adults is largely unaffected by anticipation. *Human Movement Science* (In press).

Armitano-Lago C, Davis-Wilson HC, Evans-Pickett A, Lisee C, Kershner CE, Blackburn JT, **Franz JR**, Kiefer AW, Nissman D, Pietrosimone BP. Gait Variability Structure Linked to Worse Cartilage Composition Post-ACL Reconstruction. *Medicine & Science in Sport & Exercise* (In press).

Boyer KA, Hayes KL, Umberger BR, Adamczyk PG, Bean JF, Brach JS, Clark BC, Clark DJ, Ferrucci L, Finley J, **Franz JR**, Golightly YM, Hortobagyi T, Hunter S, Narici M, Nicklas B, Roberts T, Sawicki G, Simonsick E, Kent JA. Age-related changes in gait biomechanics and their impact on the metabolic cost of walking: Report from a National Institute on Aging workshop. *Experimental Gerontology* (In press).

Takahashi KZ, Krupenevich RL, Lenz AL, Kelly LA, Rainbow MJ, **Franz JR** (2022). Mechanics and energetics of human feet: a contemporary perspective for understanding mobility impairments in older adults. *Biomechanics* 2(4): 494-499.

Munsch AE, Pietrosimone B, **Franz JR** (2022). Walking speed does not affect net vastus lateralis fascicle length change on average during weight acceptance. *Journal of Biomechanics* 114: 111300.

Zhang Q, Fragnito N, **Franz JR**, Sharma N (2022). Fused ultrasound and electromyography-driven neuromuscular model to improve plantarflexion moment prediction across walking speeds. *Journal of NeuroEngineering and Rehabilitation* 19(1): 86.

Munsch AE, Evans-Pickett A, Davis-Wilson A, Pietrosimone B, **Franz JR** (2022). Quadriceps Muscle Action and Association with Knee Joint Biomechanics in Individuals with Anterior Cruciate Ligament Reconstruction. *Journal of Applied Biomechanics* 38(5): 328-335.

Pimentel RE, Feldman JN, Lewek MD, **Franz JR** (2022). Quantifying mechanical and metabolic interdependence between speed and propulsive force during walking. *Frontiers in Sports and Active Living* 4:942498.

Beck ON, Schroeder JN, Trejo LH, **Franz JR**, Sawicki GS (2022). Shorter Muscle Fascicle Operating Lengths Increase the Metabolic Cost of Cyclic Force Production. *Journal of Applied Physiology* 133(3):524-33.

Shelton AD, McTaggart EM, Allen JL, Mercer VS, **Franz JR** (2022). Slowing Down to Preserve Balance in the Presence of Optical Flow Perturbations. *Gait & Posture* 96:365-370.

Fang Y, Harshe K, **Franz JR**, Lerner ZF (2022). Feasibility evaluation of a dual-mode ankle exoskeleton to assist and restore community ambulation in older adults. *Wearable Technologies* 3: E13.

Ahuja S and **Franz JR** (2022). The Metabolic Cost of Walking Balance Control and Adaptation in Young Adults. *Gait & Posture* 96:190-4.

Lisee C, Davis-Wilson H, Evans-Pickett A, Horton WZ, Blackburn T, **Franz JR**, Thoma L, Spang JT, Pietrosimone B (2022). Linking gait biomechanics and daily steps post ACL-reconstruction. *Medicine & Science in Sports & Exercise* 54(5):709-16.

**Franz JR**, Finni T, Takahashi KZ, Vanwanseele B, De Groote F (2022). Current Opinion: The need for systems-based biomechanics to understand the causes and consequences of altered muscle-tendon unit function in elderly gait. *Brazilian Journal of Motor Behavior* 16(1):4-7.

Davis-Wilson HC, Thoma LM, Longobardi L, **Franz JR**, Blackburn JT, Hackney AC, Pietrosimone B (2022). Quality of Life Associates with Moderate to Vigorous Physical Activity Following Anterior Cruciate Ligament Reconstruction. *Journal of Athletic Training* 57(6):532-39.

Lynch DH, Spangler H, **Franz JR**, Krupenevich RL, Kim H, Nissman D, Zhang J, Li Y, Sumner S, Batsis JA (2022). Multimodal Diagnostic Approaches to Advance Precision Medicine in Sarcopenia and Frailty. *Nutrients* 14(7):1384.

Song K, **Franz JR**, Wikstrom EA (2022). Optical Flow Balance Perturbations Alter Gait Kinematics and Variability in Chronic Ankle Instability Patients. *Gait & Posture* 92: 271-276.

Armitano-Lago CN, Pietrosimone B, Evans-Pickett A, Davis-Wilson H, **Franz JR**, Blackburn JT, Kiefer AW (2022). Cueing changes in peak vertical ground reaction force to improve coordination dynamics in walking. *Journal of Motor Behavior* 54(1):125-34.

Zhang Q, Clark WH, **Franz JR**, Sharma N (2022). Personalized fusion of ultrasound and electromyography-derived neuromuscular features increases prediction accuracy of ankle moment during plantarflexion. *Biomedical Signal Processing & Control*. 71: 103100.

Clark WH and **Franz JR** (2021). Age-Related Changes to Triceps Surae Muscle-Subtendon Interaction Dynamics During Walking. *Scientific Reports* 11(1):21264.

Lehr NL, Clark WH, Lewek MD, **Franz JR** (2021). The Effects of Triceps Surae Muscle Stimulation on Localized Achilles Subtendon Tissue Displacements. *Journal of Experimental Biology* 225(15):242135.

Krupenevich RL, Ray SF, Kashefsky HE, Takahashi KZ, **Franz JR** (2021). Effects of age and locomotor demand on foot mechanics during walking. *Journal of Biomechanics* 123:110499.

Krupenevich RL, Beck ON, Sawicki GS, **Franz JR** (2021). Reduced Achilles tendon stiffness disrupts calf muscle neuromechanics in elderly gait. *Gerontology* 16;1-11.

Waanders JB, Murgia A, DeVita P, **Franz JR**, Hortobágyi T (2021). Age does not affect the relationship between muscle activation and joint work during incline and decline walking. *Journal of Biomechanics* 124:110555.

Kim H and **Franz JR** (2021). Age-related differences in calf muscle recruitment strategies in the time-frequency domain during walking as a function of task demand. *Journal of Applied Physiology* 131(4):1348-60.

Krupenevich RL, Funk CJ, **Franz JR** (2021). Automated Analysis of Medial Gastrocnemius Muscle-Tendon Junction Displacements During Isolated Contractions and Walking Using Deep Neural Networks. *Computer Methods and Programs in Biomedicine* 206: 106120.

Pieper NL, Baudendistel ST, Hass CJ, Diaz GB, Krupenevich RL, and **Franz JR** (2021). The metabolic and mechanical consequences of altered propulsive force generation in walking. *Journal of Biomechanics* 122: 110447.

Pimentel RE, Pieper NL, Clark WH, **Franz JR** (2021). Muscle metabolic energy costs while modifying propulsive force generation during walking. *Computer Methods in Biomechanics and Biomedical Engineering* 24(14):1552-1565.

Herrero L, **Franz JR**, Lewek MD (2021). Gradually learning to increase gait propulsion in young unimpaired adults. *Human Movement Science* 75:102745.

Clark WH, Pimentel RE, **Franz JR** (2021). Imaging and simulation of inter-muscular differences in triceps surae contributions to forward propulsion during walking. *Annals of Biomedical Engineering* 49(2): 703-715.

Conway KA, Crudup KL, Lewek MD, **Franz JR** (2021). The effects of a 6-week horizontal impeding force gait training protocol on push-off intensity in older adults. *Medicine & Science in Sports & Exercise* 53(3): 574-580.

\*Editorial Feature

Awad LN, Lewek M, Kesar J, **Franz JR**, Bowden M. These legs were made for propulsion: Advancing the diagnosis and treatment of post-stroke propulsion deficits. *Journal of NeuroEngineering and Rehabilitation* 17(1):139.

Armitano-Lago CN, Pietrosimone B, Davis-Wilson H, Evans-Pickett A, **Franz JR**, Blackburn JT, Kiefer AW (2020). Biofeedback augmenting lower limb loading alters the underlying temporal structure of gait following anterior cruciate ligament reconstruction. *Human Movement Science* 73:102685.

Beck ON, Gosyne JR, **Franz JR**, Sawicki GS (2020). Cyclically producing the same average muscle-tendon force with a smaller duty increases metabolic rate. *Proceedings of the Royal Society Part B* 287(1933):2020043.

Munsch AE, Pietrosimone B, **Franz JR** (2020). The effects of knee extensor moment biofeedback on gait biomechanics and quadriceps contractile behavior. *PeerJ* 8:e9509.

Evans-Pickett A, Davis-Wilson HC, Luc-Harkey BA, Blackburn TJ, **Franz JR**, Padua DA, Seeley MK, Pietrosimone B (2020). Biomechanical Effects of Manipulating Peak Vertical Ground Reaction Force During Gait in Individuals with Anterior Cruciate Ligament Reconstruction. *Clinical Biomechanics* 76:105014.

Krupenevich RL, Clark WH, Sawicki GS, **Franz JR** (2020). Older adults overcome reduced triceps surae structural stiffness to preserve ankle joint quasi-stiffness during walking. *Journal of Applied Biomechanics* 5: 1-8.

Selgrade BP, Meyer D, Sosnoff JJ, **Franz JR** (2020). Can optical flow perturbations detect walking balance impairment in people with multiple sclerosis? *PloS One* 15(3): e0230202.

Selgrade BP, Childs, ME, **Franz JR** (2020). Effects of age and target location on reaction time and accuracy of lateral precision stepping during walking. *Journal of Biomechanics* 104:109710.

Luc-Harkey BA, **Franz JR**, Hackney AC, Blackburn JT, Padua DA, Schwartz TA, Pietrosimone B (2020). Immediate biochemical changes after gait biofeedback in individuals with anterior cruciate ligament reconstruction. *Journal of Athletic Training* 55(10):1106-1115.

Conway KA and **Franz JR** (2020). Shorter gastrocnemius fascicle lengths in older adults associate with worse capacity to enhance push-off intensity in walking. *Gait & Posture* 77: 89-94.

Pieper NL, Lewek MD, **Franz JR** (2020). Can shank acceleration provide a clinically feasible surrogate for individual limb propulsion during walking? *Journal of Biomechanics* 98(2):109449.

Waanders JB, Hortobágyi T, Murgia A, DeVita P, **Franz JR** (2020). How age and surface inclination affect joint moment strategies to accelerate and decelerate individual leg joints during walking. *Journal of Biomechanics* 98(2):109440.

Conway KA and **Franz JR** (2020). Increasing the propulsive demands of walking to their maximum elucidates functionally limiting impairments in older adult gait. *Journal of Aging and Physical Activity* 28(1):1-8.

Clark WH and **Franz JR** (2020). Triceps surae muscle-subtendon interaction differs between young and older adults. *Connective Tissue Research* 61(1):104-113. \*Invited, Special Issue on Aging.

Qiao M, Richards JT, **Franz JR** (2019). Visuomotor error augmentation affects mediolateral head and trunk stabilization during walking. *Human Movement Science* 68:102525.

Richards JT, Selgrade BP, Qiao M, Plummer P, Wikstrom EA, **Franz JR** (2019). Time-dependent tuning of balance control and aftereffects following optical flow perturbation training in older adults. *Journal of NeuroEngineering and Rehabilitation* 16(1):81.

Clark WH and **Franz JR** (2019). Activation-dependent changes in soleus length-tension behavior augment ankle joint quasi-stiffness. *Journal of Applied Biomechanics* 10: 1-8.

Browne MG and **Franz JR** (2019). Ankle power biofeedback attenuates the distal-to-proximal redistribution in older adults. *Gait & Posture* 71: 44-49.

Waanders JB, Hortobágyi T, Murgia A, DeVita P, **Franz JR** (2019). Advanced age redistributes positive but not negative leg joint work during walking. *Medicine & Science in Sports & Exercise* 51(4): 615-623.

Stenroth L, Thelen DG, **Franz JR** (2019). Biplanar ultrasound investigation of in vivo Achilles tendon displacement non-uniformity. *Translational Sports Medicine* 2(2): 73-81.

Acuña SA, Francis CA, **Franz JR**, Thelen DG (2019). The effects of cognitive load and visual feedback on antagonist leg muscle coactivation during walking for young and older adults. *Journal of Electromyography and Kinesiology* 44:8-14.

**Franz JR**, Khanchandani A, McKenney H, Clark WH (2019). Ankle rotation and muscle loading effects on the calcaneal tendon moment arm: an *in vivo* imaging and modeling study. *Annals of Biomedical Engineering* 47(2):590-600.

Luc-Harkey BA, **Franz JR**, Hackney AC, Blackburn JT, Padua DA, Pietrosimone B (2018). Lesser Lower Extremity Mechanical Loading Associates with a Greater Change in Serum Cartilage Oligomeric Matrix Protein following Walking in Individuals with Anterior Cruciate Ligament Reconstruction. *Clinical Biomechanics* 60: 13-19.

Fickey SN, Browne MG, **Franz JR** (2018). Biomechanical effects of augmented ankle power output during human walking. *Journal of Experimental Biology* 221(22).

Thompson JD, Plummer P, **Franz JR** (2018). Age and falls history effects on antagonist leg muscle coactivation during walking with optical flow perturbations. *Clinical Biomechanics* 59: 94-100.

Allen JL and **Franz JR** (2018). The motor repertoire of older adult fallers may constrain their response to balance perturbations. *Journal of Neurophysiology* 120(5):2368-2378.

Conway KA, Bissette RG, **Franz JR** (2018). The functional utilization of propulsive capacity during human walking. *Journal of Applied Biomechanics* 34(6):474-482.

Browne MG and **Franz JR** (2018). More push from your push-off: joint-level modifications to modulate propulsive forces in old age. *Plos One*; 13(8):e0201407.

Rasske K and **Franz JR** (2018). Aging effects on the Achilles tendon moment arm during walking. *Journal of Biomechanics*; 77:34-39.

Luc-Harkey BA, **Franz JR**, Blackburn JT, Padua DA, Hackney AC, Pietrosimone B (2018). Real-time Biofeedback Can Increase and Decrease Vertical Ground Reaction Force, Knee Flexion Excursion, and Knee Extension Moment during Walking in Individuals with Anterior Cruciate Ligament Reconstruction. *Journal of Biomechanics*; 76:94-102.

Clark WH and **Franz JR** (2018). Do triceps surae muscle dynamics govern non-uniform Achilles tendon tissue displacements? *PeerJ*;6:e5182.

Luc-Harkey BA, **Franz JR**, Losina E, Pietrosimone B (2018). Association between kinesiophobia and walking gait characteristics in individuals with Anterior Cruciate Ligament reconstruction. *Gait & Posture*; 64: 220-25.

Qiao M, Truong K, **Franz JR** (2018). Does local dynamic stability during unperturbed walking predict the response to balance perturbations? An examination across age and falls history. *Gait & Posture*; 62: 80-85.

Qiao M, Feld JA, **Franz JR** (2018). Aging effects on leg joint variability during walking with balance perturbations. *Gait & Posture*; 62: 27-33.

Browne MG and **Franz JR** (2017). Does dynamic stability govern propulsive force generation in human walking? *Royal Society Open Science*; 4: 171673.

Orselli MI, **Franz JR**, Thelen DG (2017). The effect of Achilles tendon compliance on triceps surae mechanics and energetics in walking. *Journal of Biomechanics*; 60: 227-31.

Zelik KE and **Franz JR** (2017). It's positive to be negative: Achilles tendon work loops during human locomotion. *PLoS One*; 12(7).

Wittenberg E, Thompson JD, Nam CS, and **Franz JR** (2017). Neuroimaging of human balance control: A systematic review. *Frontiers in Human Neuroscience*; 11:170.

Stokes HE, Thompson JD, and **Franz JR** (2017). The neuromuscular origins of kinematic variability during perturbed walking. *Nature: Scientific Reports*; 7(1): 808.

Thompson JD and **Franz JR** (2017). Do kinematic metrics of walking balance control adapt to perturbed optical flow? *Human Movement Science*; 54: 34-40.

Browne and **Franz JR** (2017). The independent effects of speed and propulsive force on joint power generation in walking. *Journal of Biomechanics*; 55:48-55.

\*Issue highlight

**Franz JR**, Francis CA, Allen MS, Thelen DG (2017). Visuomotor entrainment and the frequency-dependent response of walking balance to perturbations. *IEEE Transactions on Neural Systems & Rehabilitation Engineering*; 25(8): 1135-42.

Rasske K, Thelen DG, **Franz JR** (2017). Variations in the human Achilles tendon moment arm during walking. *Computer Methods in Biomechanics and Biomedical Engineering*; 20(2):201-5.

**Franz JR** (2016). The age-associated reduction in propulsive power generation during walking. *Exercise and Sports Sciences Reviews*; 44(4): 129-36.

\*Issue highlight and cover



**Franz JR** and Thelen DG (2016). Imaging and simulation of Achilles tendon dynamics: implications for walking performance in the elderly. *Journal of Biomechanics*; 49(9): 1403-10.

\* ASB Young Scientist Post-Doctoral Award Paper

Francis CA, **Franz JR**, O'Connor SM, Thelen DG (2015). Gait variability in healthy old adults is more affected by a visual perturbation than by a cognitive or narrow step placement demand. *Gait & Posture*; 42(3): 380-5.

**Franz JR** and Thelen DG (2015). Depth-dependent variations in Achilles tendon deformations with age are associated with reduced plantarflexor performance during walking. *Journal of Applied Physiology*; 119(3): 242-9.

**Franz JR**, Francis, CA, Allen MS, O'Connor SM, Thelen DG (2015). Advanced age brings a greater reliance on visual feedback to maintain balance during walking. *Human Movement Science*; 40: 381-92.

**Franz JR**, Slane LC, Rasske K, Thelen DG (2015). Non-uniform *in vivo* deformations of the human Achilles tendon during walking. *Gait & Posture*; 41(1): 192-7.

**Franz JR**, Maletis M, Kram R (2014). Real-time feedback enhances forward propulsion during walking in old adults. *Clinical Biomechanics*; 29(1): 68-74.

Tung KD, **Franz JR**, Kram R (2014). A test of the metabolic cost of cushioning hypothesis in shod and unshod running. *Medicine & Science in Sports & Exercise*; 46:324-9.

**Franz JR** and Kram R (2014). Advanced age and the mechanics of uphill walking: a joint-level, inverse dynamic analysis. *Gait & Posture*; 39(1):135-40.

**Franz JR** and Kram R (2013). How does age affect leg muscle activity/coactivity during uphill and downhill walking? *Gait & Posture*; 37(3):378-84.

**Franz JR** and Kram R (2013). Advanced age affects the individual leg mechanics of level, uphill, and downhill walking. *Journal of Biomechanics*; 46(3):535-40.

Stephen D, D'Andrea SE, Niemi JB, **Franz JR**, Kerrigan DC (2012). Baseline-Dependent Effect of Noise-Enhanced Insoles on Gait Variability in Healthy Elderly Walkers. *Gait & Posture*; 36(3):537-40.

**Franz JR**, Wierzbinski C, Kram R (2012). The metabolic cost of running barefoot vs. shod: Is lighter better? *Medicine & Science in Sports & Exercise*; 44(8):1519-25.

**Franz JR** and Kram R (2012). The effects of grade and speed on leg muscle activations during walking. *Gait & Posture*; 35(1):143-7.

**Franz JR**, Lyddon NE, Kram R (2012). Mechanical work performed by the individual legs during uphill and downhill walking. *Journal of Biomechanics*; 45(2):257-62.

Watt RW, Jackson K, **Franz JR**, Dicharry J, Kerrigan DC (2011). Effect of a supervised hip flexor-stretching program on gait in frail elderly. *PM&R Journal*; 3(4):330-5.

Watt RW, Jackson K, **Franz JR**, Dicharry J, Kerrigan DC (2011). Effect of a supervised hip flexor-stretching program on gait in elderly individuals. *PM&R Journal*; 3(4):324-9.

Keenan G, **Franz JR**, Dicharry J, Della Croce U, Kerrigan DC (2011). Lower limb joint kinetics in walking: the role of industry recommended footwear. *Gait & Posture*; 33(3):350-5.

Watt JR, **Franz JR**, Jackson K, Dicharry J, Riley PO, Kerrigan DC (2010). A three-dimensional kinematic and kinetic comparison of overground and treadmill walking in elderly subjects. *Clinical Biomechanics*; 25(5):444-9.

Telhan G, **Franz JR**, Dicharry J, Wilder RP, Riley PO, Kerrigan DC (2010). Moderate grade slope has no effect on three-dimensional lower limb moments during running. *Journal of Athletic Training*; 45(1):16-21.

Riley PO, **Franz JR**, Dicharry J, Kerrigan DC (2010). Changes in hip joint muscle-tendon lengths with mode of locomotion. *Gait & Posture*; 31(2):279-83.

Kerrigan DC, **Franz JR**, Keenan GS, Dicharry J, Della Croce U, Wilder RP (2009). The effect of running shoes on lower extremity net joint torques. *PM&R Journal*; 1(12):1058-63.

Dicharry J, **Franz JR**, Wilder RP, Riley PO, Kerrigan DC (2009). Differences in static and dynamic measures in evaluation of talonavicular mobility in gait. *Journal of Orthopaedic & Sports Physical Therapy*; 39(8):628-34.

**Franz JR**, Paylo KW, Dicharry J, Riley PO, Kerrigan DC (2009). Changes in the coordination of hip and pelvis kinematics with mode of locomotion. *Gait & Posture*; 29(3):494-8.

Riley PO, Bennet BC, **Franz JR**, Dicharry J, Allair PE, Miller S, Kerrigan DC (2009). Controlled partial body weight support for treadmill training – a case study. *PM&R Journal*; 1(5):496-99.

Riley PO, Dicharry J, **Franz JR**, Wilder RP, Kerrigan DC (2008). A kinematic and kinetic comparison of overground and treadmill running. *Medicine & Science in Sports & Exercise*; 40(6):1093-100.

**Franz JR**, Riley PO, Dicharry J, Allaire PE, Kerrigan DC (2008). Gait synchronized force modulation during the stance period of one limb achieved by an active partial body weight support system. *Journal of Biomechanics*; 41(15):3116-20.

**Franz JR**, Dicharry J, Riley PO, Jackson K, Wilder RP, Kerrigan DC (2008). The influence of arch support cushions on knee torques relevant to knee osteoarthritis. *Medicine & Science in Sports & Exercise*; 40(5):913-7.

**Franz JR**, Glauser M, Riley PO, Della Croce U, Newton F, Allaire PE, Kerrigan DC (2007). Physiological modulation of gait variables by an active partial body weight support system. *Journal of Biomechanics*; 40(14): 3244-50.

#### Peer-Reviewed Conference Proceedings:

Dieffenderfer J, Brewer A, Noonan M, Smith M, Eichenlaub E, Haley K, Jacks A, Lobaton E, Neupert S, Hess T, **Franz JR**, Ghosh S, Misra V, Bozkurt A. A Wearable System for Continuous Monitoring and Assessment of Speech, Gait, and Cognitive Decline for Early Diagnosis of ADRD. *IEEE Engineering in Medicine and Biology Society* (In press).

Twiddy J, Peterson K, Maddocks G, MacPherson R, Pimentel R, Yates M, Armitano-Lago C, Kiefer A, Pietrosimone B, **Franz JR**, Daniel M. A low-cost, open source wireless body area network for clinical gait rehabilitation. IEEE SENSORS (In press).

Invited Commentaries and Editorials:

**Franz JR** (2021). A sound approach to improving exoskeletons and exosuits. Science Robotics 6:60: eabm6369.

Maas H, Arndt T, **Franz JR** (2021). Tendon Structure-Function Relationship in Health, Ageing and Injury. Frontiers in Sports and Active Living, Section: Biomechanics and Control of Human Movement 3:701815.

Kram R, Arellano CA, **Franz JR** (2011). The metabolic cost of locomotion; muscle by muscle. Exercise and Sport Sciences Reviews; 39(2):57-8.

Letters to the Editor:

Kram R, **Franz JR** (2012). Is barefoot running more economical? International Journal of Sports Medicine; 33(3):249.

## GRANT SUPPORT

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Current:

R01AR081287 (Contact PI: Franz), 9/2022-8/2027

NIH/NIAMS

Co-PI: Takahashi/University of Utah Subcontract

“A framework for feasible translation to enhance foot and ankle function in aging and mobility”

Award: \$2,700,893

90REGE0017 (Lead PI: Kamper), 9/2022-8/2027

NIDILRR

“Assisting Stroke Survivors with Engineering Technology – ASSET”

Total Award: \$3,700,000

Role: Co-Investigator

Arthritis Foundation (Co-PI: Pietrosimone and Franz), 4/2023-3/2028

“UNC-Chapel Hill Biomechanics and Functional Outcomes Core (B-FUNC)”

Award: \$506,740

Major Research Instrumentation Grant (Contact PI: Franz), 11/2022-10/2024

NSF/CBET

Co-PIs: Brian Pietrosimone, J. Troy Blackburn, Kate Saul, Helen Huang

“Acquisition of a High-Speed Biplanar Fluoroscopy System for Non-Invasive Quantitative Imaging of Human Movement”

Award: \$772,571

Arthritis Foundation (PI: Pietrosimone) 10/2022-9/2025

“Gait Rehabilitation to Treat FastOA”

Role: Co-Investigator

Award: \$749,953

R01AG058615 (Contact PI: Franz), 8/2018 - 4/2024 (NCE)

NIH/NIA

Co-PI: Sawicki/Georgia Tech Subcontract

"Dynamic imaging to guide wearable robotic intervention for enhanced mobility in aging"

Award: \$1,624,214

NC TraCS ACTeR Phase 2 Award (PI: Batsis), 2/2023-1/2024

NIH/National Center for Advancing Translational Science (UL1TR002489)

"A precision nutrition approach to enhancing physical function in older adults: a pilot, feasibility study"

Role: Co-Investigator

Award: \$50,000

Orthofeet, Inc. (PI: Franz), 1/2023-12/2023

"The Effects of Footwear on Walking Biomechanics in Older and Orthopaedic Consumers"

Award: \$105,240

2023 National Innovation Corps (Contact PI: Franz; Entrepreneurial Lead: Pietrosimone)  
National Science Foundation

"An AI-Driven Wearable Sensor-Based System for Precision OA Rehabilitation"

Award: \$50,000

Eshelman Institute for Innovation (Co-PI: Franz and Pietrosimone), 7/2021-12/2023

"Development of a Portable Gait Biofeedback System for Rehabilitation of Musculoskeletal Conditions"

Award: \$182,362

Arthritis Foundation PTOA Platform (PI: Pietrosimone), 8/2020-7/2023

"Biomechanical Changes Following ACL Injury that Influence the Development of Posttraumatic Osteoarthritis"

Role: Co-Investigator

Award: \$831,879

R21AG067388 (PI: Franz), 9/2020 – 5/2024 (NCE)

NIH/NIA

"The peripheral motor repertoire as a neuromuscular constraint on walking balance integrity in age-related falls risk"

Award: \$438,943

Completed:

Pilot and Feasibility Research Grant (PI: Franz), 2/2022-1/2023

Thurston Arthritis Research Center, UNC Core Center for Clinical Research

"Pain-mediated effects of quadriceps muscle dysfunction on inflammation and cartilage loading in individuals with OA"

Award: \$25,000

Pilot and Feasibility Research Grant (PI: Pietrosimone and Lalush), 11/2021-10/2022

Thurston Arthritis Research Center, UNC Core Center for Clinical Research

"Limb Underloading post-ACL Reconstruction and Increased Cartilage Strain: Identifying Biomechanical Phenotypes at Risk for Posttraumatic Osteoarthritis and the Potential for Precision Gait Retraining in Posttraumatic Osteoarthritis Prevention"

Role: Co-Investigator

Award: \$25,000

NC TraCS ACTeR Phase 1 Award (PI: Batsis), 11/2021-10/2022  
NIH/National Center for Advancing Translational Science (UL1TR002489)  
“Using multi-modal methods to advance translational geroscience in patients with sarcopenia”  
Role: Co-Investigator  
Award: \$5,000

R21AR074094 (MPI: Franz and Pietrosimone), 8/2018 – 7/2022 (NCE)  
NIH/NIAMS  
“Using real-time biofeedback to strategically understand the acute biomechanical, biochemical and structural changes induced by lower extremity loading”  
Award: \$356,595

R01AG051748, 5/2016 - 4/2022 (NCE)  
NIH/NIA  
Co-PI: Thelen, Franz (PI/UNC Subcontract), Blemker (PI/UVA Subcontract)  
“Influence of age-related changes in tendon on motor performance”  
Award: \$1,628,546

NC TraCS Pilot Award (PI: Franz), 7/2020-6/2021  
NIH/National Center for Advancing Translational Science (UL1TR002489)  
“The peripheral motor repertoire as a neuromuscular constraint on balance integrity in age-related falls risk”  
Award: \$50,000

R41AG060764 (PI: Treadwell Corporation), 10/2018-9/2020  
NIH/NIA  
“A momentum-enabled treadling methodology to improve gait and enhance mobility in patients with peripheral arterial disease”  
Role: PI of UNC Subcontract  
Award: \$216,521 (\$130,000 to UNC)

R21AT009704 (PI: Wikstrom), 2/2018 - 7/2020  
NIH/NCCIH  
“Neuromuscular Mechanisms of Manual Therapies in Chronic Ankle Instability Patients”  
Role: Co-Investigator  
Award: \$410,499

R56AG054797 (PI: Franz), 9/2017-8/2019  
NIH/NIA  
“The sensorimotor locus of balance control in elderly gait”  
Award: \$227,738

Bank Foundation, Italy (PI: Della Croce), 7/2016-6/2019  
“A virtual-reality based platform for the concurrent measurement of gaze and gait”  
Role: Co-Investigator  
Award: €51,000

Pilot Research Grant (PI: Franz), 9/2017-2/2019  
National Multiple Sclerosis Society  
“Effect of optical flow perturbations on static and dynamic balance control in people with multiple sclerosis”  
Award: \$44,000

Outstanding Research Grant (PI: Franz), 1/1/2018-12/31/2018  
National Center for Simulation in Rehabilitation Research  
"Incorporating physiological moment arm dynamics into simulations of human movement"  
Award: \$20,000

Stage I UNC Inter-Institutional Planning Grant (Co-PI: Franz and Rhea), 7/2017-6/2018  
UNC General Administration  
"UNC system collaboration to use virtual reality to address human health challenges"  
Award: \$22,500

Seed Grant (PI: Franz), 7/2016-6/2018  
UNC/NCSU Rehabilitation Engineering Core  
"Electrocortical activity governing human balance control"  
Award: \$15,000

Seed Grant (Co-PI: Franz, Gallippi, Hu), 7/2016-6/2018  
UNC/NCSU Rehabilitation Engineering Core  
"Neurological, functional, and mechanical non-uniformity in muscle following stroke"  
Award: \$25,000

University Research Council Research Grant (PI: Franz), 5/2016-4/2018  
University of North Carolina at Chapel Hill  
"The role of propulsive capacity reserves in age-related mobility impairment"  
Award: \$7,500

NATA Research & Education Foundation (Co-PI: Franz and Wikstrom), 7/2016 – 6/2017  
"Influence of Visual Perturbations on Static and Dynamic Postural Control in Chronic Ankle Instability Patients"  
Award: \$2,000

NC TraCS Pilot Award (PI: Franz), 2/2016-1/2017  
NIH/National Center for Advancing Translational Science (UL1TR001111)  
"Visuomotor entrainment and the control of balance in elderly gait"  
Award: \$2,000

Junior Faculty Development Award (PI: Pietrosimone), 1/2016-12/2016  
University of North Carolina at Chapel Hill  
"Preventing knee osteoarthritis with a novel cartilage loading biofeedback intervention"  
Role: Co-Investigator  
Award: \$7,500

NC TraCS Pilot Award (PI: Lewek), 9/2015-8/2016  
NIH/National Center for Advancing Translational Science (UL1TR001111)  
"The importance of anterior center of mass velocity during gait on energy cost following stroke"  
Role: Co-Investigator  
Award: \$2,000

National Research Service Award (F32AG044904), 6/2013 - 6/2015  
NIH/NIA  
"Mechanics of the aging Achilles tendon with implications for walking performance"  
Role: Principal Investigator (Sponsor: Thelen DG)  
Award: \$115,658

University of Colorado Graduate School, 8/2012 -12/2012  
Dissertation Completion Fellowship  
Role: Principal Investigator (Sponsor: Kram R)  
Award: \$14,800

T32AG000279 (PI, Schwartz RS, University of Colorado Denver), 5/2010 - 5/2012  
NIH/NIA  
Integrative Physiology of Aging Training Grant  
“The effects of age on the biomechanics of uphill and downhill walking”  
Role: Pre-Doctoral Trainee (Mentor: Kram R, Junior Co-Mentor: Ahmed AA)  
Award: \$64,000

R01AG027192 (PI, Kerrigan DC), 2006 - 2009  
NIH/NIA  
“Age-related gait changes and hip flexibility”  
Role: Co-Investigator  
Award: \$769,224

Brooks Sports (PI, Dicharry J), 2007 - 2008  
“Biomechanics of the foot during barefoot and shod running”  
Role: Co-Investigator  
Award: \$102,787

R44HD040035 (PI, Harry JD, Afferent Corporation), 2006  
NIH/NICHHD  
“Enhancing elderly balance and gait using mechanical noise”  
Role: Co-Investigator of subcontract  
Award: \$31,711

#### Faculty Sponsored Student/Post-Doc Research Awards:

NIH NRSA F31. Effects of anterior cruciate ligament reconstruction on the association between quadriceps muscle dynamics, knee joint biomechanics, and articular cartilage loading during walking. 2021-2023. Pre-doctoral fellow: Amanda Munsch. Role: Sponsor.

NIH NRSA F32. “The role of foot structure and function on walking mechanics and energetics in aging.” 2020-2022. Post-doctoral fellow: Rebecca Krupenevich. Role: Sponsor.

NC State Abrams Scholarship, 2023. “Development and validation of a computer-controlled force field for emulating balance disturbances in human gait.” Undergraduate Student: Lillie Chilton.

NC State Abrams Scholarship, 2023. “Wearable sensor-based perception thresholds for remote monitoring of locomotor instability.” Undergraduate Student: Jordan Feldman.

NC State Abrams Scholarship, 2020. “A ultrasound-based framework to inform the tailored prescription of assistive devices to enhance ankle push-off.” Undergraduate student: Callum Funk.

NC State Abrams Scholarship, 2020. "A novel self-paced treadmill controller to establish cause-effect relations between reduced push-off intensity and slowed walking speed." Undergraduate student: Jordan Feldman.

UNC Lucas Scholars Research Fellowship, 2019. "Aging effects on the Achilles subtendon tissue response to gastrocnemius and soleus muscle stimulation." Undergraduate student: Maggie Wagner

NIH NRSA F31. "The Role of Muscle Dynamics in Governing Achilles Subtendon Behavior Across the Lifespan." 2019-2021. Pre-doctoral fellow: William Clark. Role: Primary Sponsor.

NIH NRSA F32. "Linking muscle-tendon dynamics and energetics to inform exoskeleton design for improved locomotor economy." 2019-2021. Post-doctoral fellow: Owen Beck. Role: Co-Sponsor.

UNC Lucas Scholars Research Fellowship, 2019. "The effects of gastrocnemius and soleus muscle stimulation on Achilles subtendon tissue displacements." Undergraduate student: Nathan Lehr.

UNC Lucas Scholars Research Fellowship, 2018. "The prevalence of neuromechanical plasticity underlying walking balance control in old age." Undergraduate student: Jackson Richards.

NC State Abrams Scholarship, 2017. "Targeted biofeedback to enhance push-off power generation in walking." Undergraduate student: Sarah Fickey.

American Physical Therapy Association Section on Research Traveling Fellowship, 2017. Visiting Post-Doctoral Scholar: Audrey Elias.

Fulbright Finland Travel Grant for Research Collaboration. 2017. Visiting Post-Doctoral Scholar: Lauri Stenroth.

Chancellor's Science Scholar Summer Research Award, 2017. "Functional utilization of propulsive capacity in human walking." Undergraduate student: Alex Mina.

NC State Abrams Scholarship, 2016. "Leveraging visuomotor entrainment to improve the diagnostics of age-related falls risk." Undergraduate student: Heather Stokes.

## TEACHING EXPERIENCE

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*University of North Carolina at Chapel Hill and North Carolina State University*

**Spring 2021**, BMME 405/890 (Biomechanics of Movement)

**Fall 2021**, BMME 205 (Biomedical Mechanics and Lab)

**Spring 2021**, BMME 405/890 (Biomechanics of Movement)

**Fall 2020**, BMME 205 (Biomedical Mechanics and Lab)

**Spring 2020**, BMME 405/890 (Biomechanics of Movement)

**Fall 2019**, BMME 205 (Biomedical Mechanics)

**Spring 2019**, BMME 405/890 (Biomechanics of Movement)

**Fall 2018**, BMME 160 (Statics)

**Spring 2018**, BMME 405/890 (Biomechanics of Movement)

**Fall 2017**, BMME 160 (Statics)

**Spring 2017**, HMSC 710 (Measurement and Analysis of Human Muscle Function)

**Spring 2017**, BMME 405/890 (Biomechanics of Movement)

**Fall 2016**, BMME 160 (Statics)

**Spring 2016**, BMME 490 (Biomechanics I)



*Edgewood College, Dept. of Biology*

**Fall 2013**, Guest Lecture, BIO 220 (Introduction to Human Biomechanics)

*University of Wisconsin-Madison, Dept. of Biomedical Engineering*

**Fall 2013**, Guest Lecture, BME 315 (Biomechanics)

*University of Colorado Boulder, Dept. of Integrative Physiology*

**Fall 2012**, Guest Lecture, IPHY4540 (Biomechanics)

**Spring 2012**, Guest Lecture, IPHY4540 (Biomechanics)

**Fall 2011**, Guest Lecture, IPHY 6010 (Locomotion Energetics)

**Fall 2009**, Lead Graduate Teaching Assistant, IPHY4540 (Biomechanics)

*Virginia Polytechnic Institute and State University, Dept. of Engineering Science and Mechanics*

**Spring 2006**, Graduate Teaching Assistant, ESM 2074 (Computational Methods)

## **PATENTS/IP DISCLOSURES**

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**Franz JR** and Pietrosimone B. Portable Gait Biofeedback System for Rehabilitation of Musculoskeletal Conditions. IP Disclosure (Filed: 3/18/2021). Provisional patent (Filed: 8/23/2022; Serial No. 63/400,163).

**Franz JR** and Qiao Mu. A method of visuomotor error augmentation for balance rehabilitation. IP Disclosure (Filed: 12/18/2016). Provisional patent (Filed: 3/16/2020, Serial No. 62/990,417). Regularized patent (Filed: March 2020).

**Franz JR** and Conway KA. A horizontal impeding force system to improve strength and enhance gait performance. IP Disclosure (Filed: 3/8/2020).

Thelen DG, **Franz JR**, Slane LC, Thomas CJ. A System and method to functionally evaluate muscle and tendon mechanics. IP Disclosure (Filed: 5/21/2013).

**Franz JR** and Kram R. System and methods for measuring propulsive force during ambulation and providing real-time feedback. Regularized patent (Filed: 05/08/2014). Provisional patent (Filed: 05/08/2013).

## **ENTREPRENEURIAL ACTIVITIES AND AWARDS**

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Participant, NSF Mid-Atlantic Regional Innovation Corps (I-Corps), January 2023

NSF National I-Corps (\$50k), May 2023

VETTA Solutions, NC Biotechnology Center Industrial Internship Award (\$3500), January 2023

## **MENTORING EXPERIENCE**

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### **Post-Doctoral Trainees**

Ross Smith, Ph.D.,

Rebecca Krupenevich, Ph.D.

- Current position: AAAS Science and Technology Fellow  
NIH/NIA

Hoon Kim, Ph.D.

- Current position: Assistant Professor  
SoonChunHyang University

Brian Selgrade, Ph.D.

- Current position: Assistant Professor  
Westfield State

August 2022 - Present  
January 2019 – August 2022

January 2020 – February 2021

January 2018 - August 2019

Mu Qiao, Ph.D.

August 2016 – February 2018

- Current position: Assistant Professor  
Louisiana Tech

### Doctoral Students

Aubrey Gray, UNC/NCSU Biomedical Engineering	Spring 2022 - Present
Emily Eichenlaub, UNC/NCSU Biomedical Engineering	Fall 2019 - Present
Andrew Shelton, UNC/NCSU Biomedical Engineering	Fall 2020 - Present
Richard Pimentel, UNC/NCSU Biomedical Engineering	Fall 2019 - Present
Mandy Munsch, UNC/NCSU Biomedical Engineering	Fall 2018 - Present
William Clark, UNC/NCSU Biomedical Engineering	Fall 2016 – Fall 2020

- Current position: Research Engineer  
SPR Therapeutics, Inc.

Katie Conway, UNC/NCSU Biomedical Engineering	Fall 2016 – Spring 2020
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- Current position: R&D Leadership Development Program  
Siemens Healthineers

Michael Browne, UNC/NCSU Biomedical Engineering	Fall 2015 – Spring 2019
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- Current position: Clinical Assistant Professor  
University of Illinois at Chicago

### Master's Students

Andrew Marron, UNC/NCSU Biomedical Engineering	Spring 2017 – Spring 2018
Jessica Thompson, UNC/NCSU Biomedical Engineering	Fall 2015 – Spring 2017

### Visiting Scholars

Constantin Beyer, Technische Universität Ilmenau	Fall 2022– Present
Yujin Kwon, UNIST, South Korea	Spring 2022–Fall 2022
Daniel Urrego, Universidad de Antioquia in Medellín, Colombia	Fall 2021
Jeroen Waanders, University of Groningen	Spring 2017 – Fall 2017
Sidney Baudendistel, University of Florida	Summer 2019

### Doctoral Students (not chair)

Logan White, University of Nebraska Omaha, Biomechanics	Spring 2022 – Present
Jaeho Jang, UNC Chapel Hill Human Movement Science	Spring 2021 – Present
Benjamin Shafer, Georgia Tech, Robotics	Spring 2021 – Present
Ruth Stout, UNCG Kinesiology	Fall 2019 – Summer 2022
Bretta Fylstra, UNC/NCSU Biomedical Engineering	Spring 2019 – Fall 2021
Qiang Zhang, UNC/NCSU Biomedical Engineering	Fall 2020 – Fall 2021
Aaron Fleming, UNC/NCSU Biomedical Engineering	Fall 2019 – Fall 2021
Hope Davis, UNC Chapel Hill Human Movement Science	Fall 2018 – Spring 2020
Henry Shin, UNC/NCSU Biomedical Engineering	Spring 2018 – Spring 2019
Andrea Brandt, UNC/NCSU Biomedical Engineering	Spring 2017 – Spring 2019
Yue Wen, UNC/NCSU Biomedical Engineering	Fall 2016 – Spring 2019
Jon Doering, UNC/NCSU Biomedical Engineering	Fall 2015 – Fall 2018
FJ Goodwin, UNC Chapel Hill Human Movement Science	Fall 2016 – Spring 2018
Brittney Luc, UNC Chapel Hill Human Movement Science	Fall 2015 – Spring 2017
Carrie Francis, UW-Madison Biomedical Engineering	Spring 2013 – Spring 2016

### Master's Students (not chair)

Zoey Kearns, University of Memphis, Movement Sciences	Fall 2020 – Fall 2021
James McCall, UNC/NCSU Biomedical Engineering	Fall 2017 – Summer 2019
Kristen Rasske, UW-Madison Biomedical Engineering	Spring 2013 – Fall 2015

### Undergraduate Students

Ava Cook, UNC/NCSU Biomedical Engineering	Spring 2023 - Present
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Anh Nguyen, UNC/NCSU Biomedical Engineering	Spring 2023 - Present
Lucas Kiukawa, UNC/NCSU Biomedical Engineering	Spring 2023 - Present
Roberta Muraira, UNC/NCSU Biomedical Engineering	Spring 2023 - Present
Kevin Lima, UNC/NCSU Biomedical Engineering	Fall 2022 - Present
Shikha Saxena, UNC/NCSU Biomedical Engineering	Fall 2022 - Present
Virginie Ruest, UNC/NCSU Biomedical Engineering	Fall 2022 - Present
Lillian Chilton, UNC/NCSU Biomedical Engineering	Spring 2022 - Present
Carly Rauch, UNC/NCSU Biomedical Engineering	Spring 2022 - Present
Kurumi Adachi, UNC/NCSU Biomedical Engineering	Spring 2022 - Present
Madison Wissman, UNC/NCSU Biomedical Engineering	Spring 2021 - Present
Jordan Feldman, UNC/NCSU Biomedical Engineering <sup>b</sup>	Fall 2020 – Present
Avantika Pandita, UNC/NCSU Biomedical Engineering	Spring 2022 – Fall 2022
Ellora McTaggart, UNC/NCSU Biomedical Engineering <sup>b</sup>	Fall 2020 - Spring 2022
Callum Funk, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Spring 2020 - Spring 2022
Maggie Wagner, UNC/NCSU Biomedical Engineering <sup>b</sup>	Fall 2019 - Spring 2022
Meaghan Quinn, UNC/NCSU Biomedical Engineering <sup>b</sup>	Fall 2019 - Spring 2021
Arya Pontula, UNC/NCSU Biomedical Engineering <sup>b</sup>	Fall 2018 - Fall 2020
Noah Pieper, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Fall 2018 - Fall 2021
Gabriela Diaz, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Spring 2019 - Spring 2020
Keyaira Crudup, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Fall 2018 - Spring 2020
Nathan Lehr, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Summer 2018 - Spring 2020
Sam Vinogradov, UNC/NCSU Biomedical Engineering	Spring 2018 - Spring 2020
Marcus Childs, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Spring 2018 - Spring 2019
Jackson Richards, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Spring 2017 - Spring 2019
Sarah Fickey, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Spring 2017- Spring 2018
Hannah McKenney, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Spring 2016 - Spring 2018
Ashish Khanchandani, UNC (Quantitative Biology) <sup>a,b</sup>	Spring 2016 - Spring 2018
Randall Bisette, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Fall 2015 - Fall 2017
Alex Mina, UNC/NCSU Biomedical Engineering	Spring 2017 - Fall 2017
Maureen Desmond, UNC/NCSU Biomedical Engineering	Fall 2016 - Spring 2017
Heather Stokes, UNC/NCSU Biomedical Engineering <sup>a,b</sup>	Fall 2015 - Spring 2017
Rachel Lanzone, UNC/NCSU Biomedical Engineering	Spring 2016 - Fall 2016
Michela Maletis, CU Boulder (Integrative Physiology) <sup>a,b</sup>	Spring 2012
Alyse Kehler, CU Boulder (Integrative Physiology) <sup>b</sup>	Fall 2011 - Spring 2012
Lauren MacDonald, CU Boulder (Integrative Physiology) <sup>b</sup>	Fall 2011 - Spring 2012
Nicholas Lyddon, CU Boulder (Integrative Physiology) <sup>a,b</sup>	Fall 2010 - Spring 2011
Corbyn Wierzbinski, CU Boulder (Integrative Physiology) <sup>a,b</sup>	Spring 2010 - Spring 2011

<sup>a</sup> Research resulted in peer-reviewed publication

<sup>b</sup> Research resulted in peer-reviewed conference abstract

## HONORS & AWARDS

Co-PI, Collaborative Exchange Grant, Orthopaedic Research Society, 2023-24  
 Joint Department of Biomedical Engineering, Service Achievement Award, 2022-23  
 PI Awardee, Research Infrastructure Equipment Allocation (\$39,000), UNC SoM, 2022  
 Program Chair, Elected Position, American Society of Biomechanics Executive Board, 2022  
 UNC Kenan Senior Faculty Research and Scholarly Leave, 2022  
 NAE China-America Frontiers of Engineering Symposium, Participant, 2022  
 Joint Department of Biomedical Engineering, Service Achievement Award, 2021-22  
 UNC-Chapel Hill, Chapman Family Teaching Award, Winner, 2022  
 Journal of Biomechanics Award, American Society of Biomechanics, 2021  
 UNC-Chapel Hill, Chapman Family Teaching Award, Finalist, 2021  
 Academic Career Leadership Academy in Medicine (ACCLAIM) Program, 2019-2020  
 NIH Clinical Research Loan Repayment Program (LRP) Award, 2017-2019  
 Tanner Award for Excellence in Undergraduate Teaching, Nominee, 2018, 2019

National Academies Scientific Teaching Fellow, 2017-2018  
NIH TIGRR (Training in Grantsmanship in Rehabilitation Research) Fellow, 2017  
Young Scientist Post-Doctoral Award, American Society of Biomechanics, 2015  
New Investigator Award (Clinical/Applied Aging Research), UW-Madison Institute on Aging, 2013  
Integrative Physiology Fellowship Travel Award, University of Colorado, 2012  
Popular Choice Award finalist, American Society of Biomechanics Annual Meeting, 2011  
Force & Motion Foundation Travel Scholarship, 2011  
United Government of Graduate Students Academic Travel Award, University of Colorado, 2011  
Graduate Student Grant-In-Aid, American Society of Biomechanics, 2010  
Outstanding Senior Design Project, Engineering Science and Mechanics, Virginia Tech, 2004

## **PROFESSIONAL SERVICE**

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### **Joint Department of Biomedical Engineering, UNC-Chapel Hill and NC State**

Liaison, Faculty Affairs and leadership Development, Spring 2023 – Present  
Director of Well-Being, Fall 2021 – Present  
Diversity Pipeline Committee, Fall 2020 – Present  
Graduate Curriculum Committee, Fall 2017 – Present  
Department Strategic Planning Committee, Summer 2022 – Fall 2022  
Chair, Department Achievement Award Committee, Spring 2022  
Graduate Program Strategic Planning Core, Fall 2019 – Fall 2021  
Teaching Track Faculty Search Committee (Chair), Fall 2020 – Spring 2021  
Member, BME Research Retreat Planning Committee, 2019  
Abram's Scholarship Committee, 2016, 2019, 2022  
Lucas Scholars Review Committee, 2020  
Brand Identity and Strategic Communications Committee, 2016  
Service Award Selection Committee, 2016

### **Human Movement Science Program, UNC-Chapel Hill**

Program Director Search Committee (Chair), Fall 2020  
Biomechanics Curriculum Committee, Spring 2019

### **College of Arts and Sciences, UNC-Chapel Hill**

Diversity Liaison, Department of Biomedical Engineering, Fall 2016 – Fall 2019

### **School of Medicine, UNC-Chapel Hill**

Co-Chair, Well-Being Research Subcommittee, 2022-  
Interviewer, M.D./Ph.D. Program Admissions, 2016, 2017, 2021  
Committee Member, 5-Year Review, Department of Allied Health Sciences, August 2019

### **UNC-Chapel Hill**

Member, Biomedical Sciences Institutional Review Board, 2018 – 2022  
Natural Sciences Subcommittee, SURF Program, 2019

### **Service to the Field**

Member, Data Safety Monitoring Board for R01AG075098 (NIH). "Preoperative perturbation training to prevent falls after total knee arthroplasty." 2022-Present  
Program Chair, North American Congress of Biomechanics, 2022  
Associate Editor, Journal of Applied Biomechanics, November 2019 - Present  
Editorial Board Member, Journal of Applied Biomechanics, October 2017 – November 2019  
Editor, Tendon Structure-Function Relationship in Health, Ageing and Injury. Frontiers in Bioengineering and Biotechnology. 2019.  
Abstract Review Committee, International Society of Biomechanics Meeting, Spring 2019  
External Examiner (Ph.D. Thesis), University of Queensland, Fall 2017  
National Biomechanics Day, Executive Board Member, 2017 – 2018

Abstract Review Committee, 7<sup>th</sup> World Congress of Biomechanics, 2014  
Moderator, Biomch-L Literature Update, 4/2013 – 7/2014

American Society of Biomechanics:

Executive Board: Program Chair Elect (2021) and Program Chair (2022)  
Communications Committee, 2012-2017  
Student Mentoring Program, 2015 - Present

Session Chair, Annual Meeting:

2012 (Aging Symposium)  
2013 (Instrumentation)  
2015 (Aging and the neuromuscular control of walking)  
2016 (Slips, trips, and falls)  
2017 (Mechanics and control of walking)  
2019 (Functional Analysis Using Ultrasound Imaging)

Abstract Review Committee, Annual Meeting, 2013 -  
Aging Symposium organizer and co-chair, Annual Meeting, 2012  
Student Advisory Committee, 1/2011 - 8/2012

Manuscript Reviewer:

Annals of Biomedical Engineering, ASME Journal of Biomechanical Engineering, Applied Bionics and Biomechanics, Clinical Biomechanics, Exercise and Sport Sciences Reviews Experimental Brain Research, Experimental Gerontology, Frontiers in Physiology, Gerontology, Gait & Posture, IEEE Transactions on Neural Systems and Biomedical Engineering, Journal of Applied Biomechanics, Journal of Applied Physiology, Journal of Biomechanics, Journal of Experimental Biology, Journal of Neurophysiology, Journal of Orthopedic Research, Journal of Science and Medicine in Sport, Medicine & Science in Sports & Exercise, Nature: Scientific Reports, PeerJ, PLoS One, Royal Society Interface, Scandinavian Journal of Medicine & Science in Sports

Grant Reviewer:

2023 ZRG1 F10B C20 (Fellowship), Musculoskeletal, Rehabilitation and Skin Sciences, February 2023  
2022 NSF DBCS, September 2022  
2022 NIDILRR RERC (Recreational, Sport, and Exercise Technologies for People with Disabilities), July 2022  
2022 US-Israel Binational Science Foundation, March 2022  
2021 ZDC1 SRB-E 26 L, Hearing and Balance, NIH/NIDCD, June 2021  
2021 ZAG1 ZIJ-5 (M1), Aging and Balance, NIH/NIA, February 2021  
2021 ZGM1 RCB-W, Special Emphasis Panel, NIH/NIGMS, November 2020  
Integrative Science and Engineering Center, University of Dayton, February 2020  
Precision Health Program Investigator Awards, University of Michigan, October 2019  
German Academic Exchange Service (Post-Doctoral Fellowships), November 2018  
ETH Zurich Research Commission (Post-Doctoral Fellowships), October 2018  
Early Career Reviewer program, NIH Center for Scientific Review (CSR), 2017- Present  
Remote Referee, Research Foundation - Flanders (Belgium), May 2013, May 2018

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## **SOCIETY MEMBERSHIPS**

American Society of Biomechanics  
International Society of Biomechanics  
American Association for the Advancement of Science

## INVITED SEMINARS AND SYMPOSIA

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Foot and Ankle Neuromechanics in Age-Related Mobility Decline: From Mechanisms to Translational Opportunities. European Society of Biomechanics. Perspective Keynote. July 2023.

The Neuromechanics of Walking Ability Limitations in Old Age: From Mechanisms to Engineered Solutions. Robotics Group. Department of Mechanical Engineering. Queen's University at Kingston. February 2023.

The Neuromechanics of Walking Ability Limitations: From Mechanisms to Engineered Solutions. Robotics Group. Sports Medicine Institute. University of North Carolina at Chapel Hill. October 2023.

A Technology-Driven Approach to Rehabilitation: From Biofeedback Technologies to Musculoskeletal Simulation. North Carolina Medical Society – LEAD Conference. October 2022.

The Neuromechanics of Walking Ability Limitations: From Mechanisms to Engineered Solutions. Robotics Group. College of Engineering. University of Washington. October 2022.

The Neuromechanics of Walking Ability Limitations: From Mechanisms to Engineered Solutions. Physical Activity & Sedentary Behavior Research Group. University of North Carolina at Chapel Hill. September 2022.

In Vivo Imaging, Muscle Neuromechanics, and Rehabilitation for OA Prevention. Osteoarthritis Action Alliance. December 2021.

A Mechanism-Based Approach to Rehabilitation Engineering for Safe and Independent Mobility in Older Adults. Plenary Talk: IEEE MHS2021(Micro-nano Mechatronics and Human Science). Nagoya, Japan. December 2021.

The mechanical and metabolic consequences of aging effects on muscle-tendon units powering locomotion: moving beyond observational inquiry. NIA workshop: Causes & consequences of age-related changes in gait biomechanics. September 2021.

A mechanism-based approach to diagnostics and rehabilitation to preserve safe and independent mobility in older adults. Department of Mechanical and Aerospace Engineering. University of Central Florida. March 2021.

Mechanics, Energetics, and Stability: Modifiable factors to preserve independent mobility in old age. Department of Kinesiology and Applied Physiology. University of Delaware. February 2020.

Mechanics, Energetics, and Stability: Modifiable factors to preserve independent mobility in old age. Department of Biomechanics. University of Nebraska Omaha. October 2019.

Mechanics, Energetics, and Stability: Modifiable factors to preserve independent mobility in old age. Department of Integrative Physiology. University of Colorado Boulder. November 2019.

Improving our understanding of the origins and functional consequences of Achilles subtendon sliding in walking. In: Integrating multi-scale approaches to tendon biomechanics. International Society of Biomechanics. Calgary, AB (Canada). August 2019.

Central and Peripheral Control of Balance in Older adults. NIA/NIDCD Workshop. Bethesda, MD. April 2019.

Harnessing the potential of rehabilitative technology to enhance mobility and prevent falls. John. A Paulson School of Engineering and Applied Sciences + Wyss Institute for Biologically Inspired Engineering, Harvard University. April 2019.

Harnessing the potential of rehabilitative technology to enhance mobility and prevent falls. Kinesiology and Community Health Colloquium Series. University of Illinois at Urbana-Champaign. November 2018.

Muscle and tendon – a complicated friendship. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018.

Dynamic medical imaging techniques for biomechanics systems. 8<sup>th</sup> World Congress of Biomechanics. Dublin, Ireland. July 2018.

Diagnosing and treating deficits in propulsion to improve walking after stroke - Clinical and technological advances (Symposium II). APTA Combined Sections Meeting. New Orleans, LA. February 2018.

Aging effects on the neuromechanics of gait and balance control. Department of Kinesiology Symposium. Pennsylvania State University. February 2018.

Diagnosing and treating deficits in propulsion to improve walking after stroke - Clinical and technological advances (Symposium I). American Congress of Rehabilitation Medicine. Atlanta, GA. October 2018.

Aging effects on the neuromechanics of gait and balance control. Division of Geriatrics Seminar Series. University of North Carolina at Chapel Hill. Chapel Hill, NC. July 2017.

The biomechanics and neural control of locomotor performance in old age. Motor Behavior Research Network Seminar. University of North Carolina Greensboro. Greensboro, NC. May 2017.

The biomechanics and neural control of locomotor performance in old age. Department of Orthopaedics Grand Rounds. University of North Carolina at Chapel Hill. Chapel Hill, NC. April 2017.

Structure, function, and control of the aging musculoskeletal system during locomotion. Department of Physical Therapy and Human Movement Sciences Grand Rounds. Northwestern University. Chicago, IL. November 2016.

Aging effects on the structure, function, and control of the human musculoskeletal system during locomotion. Human Movement Science Seminar Series. University of North Carolina at Chapel Hill. Chapel Hill, NC. October 2016

The neuromuscular biomechanics of aging: new insights and their clinical implications. Department of Kinesiology and Nutrition Seminar. University of Illinois at Chicago. Chicago, IL. January 2015.

The neuromuscular biomechanics of aging: new insights and their clinical implications. Joint Department of Biomedical Engineering Seminar. University of North Carolina and North Carolina State University. Chapel Hill, NC. January 2015.

The neuromuscular biomechanics of aging: new insights and their clinical implications. School of Kinesiology Seminar. University of Michigan. Ann Arbor, MI. November 2014.

The underutilized propulsive reserve of older adults during walking. UW-Madison Interface Colloquium (Science, Technology, and Society). University of Wisconsin. Madison, WI. October 2013.

The loss of walking ability with age: moving beyond muscle weakness. Dept. of Kinesiology Seminar. University of Wisconsin. Madison, WI. October 2013.

The biomechanics of advanced age: insights gained from older adults walking uphill. Dept. of Mechanical Engineering Lindbergh Lecture Series. University of Wisconsin. Madison, WI. March 2013.

How does age affect individual leg mechanics during uphill and downhill walking? Symposium: Effects of aging on the biomechanics and energetics of gait. American Society of Biomechanics Annual Meeting. Gainesville, FL. August 2012.

Aging and the biomechanics of uphill and downhill walking. Neuromuscular Biomechanics Seminar. University of Wisconsin. Madison, WI. June 2012.

Opportunities for student involvement in ASB. Student Event. American Society of Biomechanics Annual Meeting. Long Beach, CA. August 2011.

Methods in human movement analysis. University of Virginia Running Medicine Conference. Charlottesville, VA. March 2007.

## CONFERENCE ABSTRACTS

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Cone S, **Franz JR**, Baxter J, Thelen DG. Structure-Function Assessments in the Achilles Tendon: Applications in Times of Both Health and Post-Operative Regeneration. International Scientific Tendinopathy Symposium. Valencia, Spain. November 2023.

Wissman MW, Gray, AJ, Krupenevich RL, Takahashi K, **Franz JR**. Modeling the connection between the plantar fascia and triceps surae during fixed-end contractions. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Trejo LH, **Franz JR**, Sawicki GS. Older adults benefit more than younger adults from active but not passive ankle exoskeletons. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Smith RE, Shelton AD, Sawicki GS, **Franz JR**. Plantarflexor weakness and lesser Achilles tendon stiffness associate with greater vulnerability to walking balance perturbations. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Shelton AD, Allen JL, Mercer VS, Crenshaw JR, **Franz JR**. Surveys of self-perceived balance integrity are poor predictors of vulnerability to balance perturbations. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Pimentel R, Trejo L, Saul K, Sawicki G, **Franz JR**. The interactive effects of biological tendon and ankle exoskeleton stiffness on walking metabolic cost. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Pimentel R, Trejo L, Saul K, Sawicki G, **Franz JR**. The interactive effects of biological tendon and ankle exoskeleton stiffness on walking metabolic cost. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.



Munsch AE, Pietrosimone B, **Franz JR**. Quadriceps strength symmetry is not a prerequisite to augmenting peak knee extensor moment in individuals with anterior cruciate ligament reconstruction. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Maddox GT, Shelton AD, Mercer VS, Crenshaw JR, **Franz JR**, Allen JL. Reduced muscle coordination complexity alters walking balance control across a diverse range of perturbations in older adults. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Lima K, Shelton AD, Allen JL, Mercer V, **Franz JR**. Older adults use a more cautious strategy to navigate turns while walking. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Feldman JN, Beyer CW, Allen JL, **Franz JR**. Wearable sensor detection of treadmill-induced slip perturbations. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Gray A, Krupenevich RL, Takahashi K, **Franz JR**. Age affects mechanical transmission between metatarsal phalangeal joint extension and plantarflexor muscle lengthening. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Gray A, Adamczyk P, **Franz JR**. The effects of age and task demand on dynamic mean ankle moment arm during walking. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Eichenlaub EK, Allen J, Mercer V, Crenshaw J, **Franz JR**. The anticipation and direction of treadmill-induced slip perturbations affects the neuromechanical behavior of distal leg muscles. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Eichenlaub EK, Gelinne AM, Bhowmick D, **Franz JR**. The effects of cervical spine immobilization and deformities on walking balance. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Alshareef AA, Moore O, **Franz JR**, Sawicki GS. Ankle exoskeletons mitigate calf muscle fatigue over 30-min walking bouts. American Society of Biomechanics Annual Meeting. Knoxville, TN. August 2023.

Kwon Y, Chilton L, Kim H, Sawicki G, **Franz JR**. Effects of age on Muscle Activity Patterns during Prolonged Walking. 45th Annual International Conference of the IEEE Engineering in Medicine & Biology Conference (EMBC). Sydney, Australia. July 2023.

Beyer CW, Feldman J, Allen J, **Franz JR**. Local muscle detection of treadmill-induced slip perturbations. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Gray A, Krupenevich RL, Takahashi K, **Franz JR**. Age affects mechanical transmission between metatarsal phalangeal joint extension and plantarflexor muscle lengthening. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Lima K, Shelton AD, Allen JL, Mercer VS, **Franz JR**. Older adults use a more cautious strategy to navigate turns while walking. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Wissman M, Gray A, Krupenevich RL, Takahashi K, **Franz JR**. Modeling the connection between the plantar fascia and triceps surae during fixed-end contractions. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Adachi K, Shelton AD, Kwon Y, **Franz JR**. Local dynamic instability during prolonged walking does not predict susceptibility to balance perturbations. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Cisne B, Dorsey J, Lisee C, Lalush D, Armitano-Lago C, Bjornsen E, Buck A, Büttner C, **Franz JR**, Pietrosimone B. Intra-rater, inter-rater, and test-retest reliability of cartilage thickness segmentation for implementation in cartilage strain assessment. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Sallis O, Armitano-Lago C, Bjornsen E, Evans-Pickett A, Munsch AE, **Franz JR**, Pietrosimone B. Preliminary analysis of lower extremity loading in ACL reconstructed individuals following a gait retraining intervention using real-time gait biofeedback. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Bjornsen E, Berkoff D, Blackburn JT, Davis-Wilson H, Evans-Pickett A, **Franz JR**, Harkey M, Lisee C, Luc-Harkey B, Munsch AE, Nissman D, Pfeiffer S, Pietrosimone B. Comparing ground reaction force profiles in individuals early following anterior cruciate ligament reconstruction to individuals with radiographic knee osteoarthritis. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Jang J, Pietrosimone BG, **Franz JR**, Wikstrom EA. Muscle contributions and ankle joint contact forces are altered during drop vertical jump landings in patients with chronic ankle instability. Human Movement Science Research Symposium. Chapel Hill, NC. May 2023.

Pimentel R, Trejo L, Saul K, Sawicki G, **Franz JR**. The interaction between biological tendon and ankle exoskeleton stiffnesses on walking metabolic cost. NSF Dare Conference: Transformative Opportunities for Modeling in Neurorehabilitation. Los Angeles, CA. March 2023.

Mo J, Armitano-Lago A, Davis-Wilson HC, Evans-Pickett A, Blackburn JT, **Franz JR**, Pietrosimone B. Associations between gait variability structure and patient-reported outcomes following anterior cruciate ligament reconstruction. Osteoarthritis Research Society International Annual Meeting. Denver, CO. March 2023.

Buck A, Lisee C, Bjornsen E, Schwartz T, Spang J, **Franz JR**, Blackburn JT, Pietrosimone B. Biomechanical threshold values for identifying posttraumatic osteoarthritis-related symptoms six months following anterior cruciate ligament reconstruction. Research Society International Annual Meeting. Denver, CO. March 2023.

Armitano-Lago C, Evans-Pickett A, Davis-Wilson H, Munsch A, Longobardi L, Willcockson H, Schwartz TA, **Franz JR**, Pietrosimone B. Acute and delayed serum cartilage oligomeric matrix protein response to altered loading during walking following ACLR. Osteoarthritis Research Society International Annual Meeting. Denver, CO. March 2023.

Bjornsen E, Berkoff D, Blackburn T, Davis-Wilson H, Evans-Pickett A, **Franz JR**, Harkey M, Lisee C, Luc-Harkey B, Munsch A, Nissman D, Pfeiffer S, Pietrosimone B. Comparing ground reaction force profiles in individuals early following anterior cruciate ligament reconstruction to individuals with radiographic knee osteoarthritis. Osteoarthritis Research Society International Annual Meeting. Denver, CO. March 2023.

Wagner MM, Clark WH, **Franz JR**. The aging Achilles tendon: model-predicted changes in calf muscle neuromechanics. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Shelton AD, McTaggart EM, Allen JL, Mercer VS, Crenshaw JR, **Franz JR**. Susceptibility to walking balance perturbations may generalize across contexts. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Cone SG, Kim H, **Franz JR**, Thelen DG. High-field MRI analysis of the 3D geometry of the triple-bundle Achilles tendon. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Pimentel R, Armitano-Lago C, Pietrosimone BG, **Franz JR**. Efficacy of in-sole sensors to detect limb loading changes using biofeedback. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Maddox GT, Carey HD, Shelton AD, Mercer VS, Crenshaw JR, **Franz JR**, Allen JL. Muscle coordination complexity across different locomotor tasks in young adults. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Pimentel R, Kiefer AW, **Franz JR**. Increasing kinematic fidelity improves predictions of walking metabolic cost. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Kim H, Kwon T, Shelton AS, Chilton L, **Franz JR**. The effects of walking related fatigue on EMG mean frequency and response to balance perturbations. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Duque Urrego D, Pimentel RE, **Franz JR**. Kinematic and kinetic determinants of limb force and preferred speed during self-paced walking. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Munsch AE, Evans-Pickett A, Davis-Wilson H, Pietrosimone B, Roth JD, **Franz JR**. Limb underloading transmits less dynamic tibiofemoral contact forces after ACLR. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

McTaggart EM, Shelton AD, Allen JL, Mercer VS, Crenshaw JR, **Franz JR**. Does locomotor reaction time generalize between gait imitation and walking? North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Eichenlaub E, Duque Urrego D, Sapovadia S, Allen J, Mercer V, Crenshaw J, **Franz JR**. The neuromechanics of anticipated and unanticipated walking balance perturbations. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Carey HD, Maddox GT, Shelton AD, Mercer VS, Crenshaw JR, **Franz JR**, Allen JL. Young adults recruit a task-specific motor module during lateral precision stepping. North American Congress on Biomechanics. Ottawa, Canada. August 2022.

Armitano-Lago C, Davis-Wilson HC, Evans-Pickett A, Lisee C, Kershner CE, Blackburn JT, **Franz JR**, Kiefer AW, Nissman D, Pietrosimone B. More regular gait patterns associate with worse femoral cartilage composition following anterior cruciate ligament reconstruction. American College of Sports Medicine. San Diego, CA. June 2022.

Migel K, Cain M, Pietrosimone BP, Blackburn JT, **Franz JR**, Song K, Jang J, Wikstrom EA. Impact of manual therapy on landing kinematics and kinetics in people with Chronic Ankle Instability. National Athletic Trainer's Association convention. Philadelphia, PA. June 2022.

Lisee C, Evans-Pickett A, Davis-Wilson H, Longobardi L, **Franz JR**, Munsch A, Pietrosimone B. Delayed Biochemical Joint Tissue Response to Loading is Associated with Femoral Cartilage

Composition Post-ACL Reconstruction. American College of Sports Medicine. San Diego, CA. June 2022.

Kearns ZC, Krupenevich R, **Franz JR**, Powell DW, Paquette MR, Resistance training for middle-aged runners: can we put a 'pep in their step'? American College of Sports Medicine. San Diego, CA. June 2022.

Evans-Pickett A, Davis-Wilson H, Munsch A, Blackburn JT, **Franz JR**, Pietrosimone BG. Real-time Biofeedback Elicits Bilateral Changes in Gait Biomechanics in Patients with Anterior Cruciate Ligament Reconstruction. American College of Sports Medicine. San Diego, CA. June 2022.

Wikstrom EA, Cain MS, Song K, Migel K, Jang J, Fin FC, Pietrosimone BG, Blackburn JT, **Franz JR**. Two-week Plantar Massage but not Ankle Joint Mobilization Intervention Reduces Visual Reliance in those with Chronic Ankle Instability. National Athletic Trainers' Association. Philadelphia, PA. June 2022.

Jang J, Pietrosimone BG, Lin FC, **Franz JR**, Wikstrom EA. Impulse Variability During Walking Higher in those with Chronic Ankle Instability. National Athletic Trainers' Association. Philadelphia, PA. June 2022.

Spangler H, Lynch D, Worth A, **Franz JR**, Krupenevich RL, Kim H, Conway K, Batsis JA. Correlations between gastrocnemius cross-sectional area and physical function in older adults. American Gerontological Society. Orlando, FL. May 2022.

Rosenberg E, Evans-Pickett A, Padua DA, **Franz JR**, Blackburn JT, Schwartz TA, Pietrosimone B. Time post-anterior crucial ligament reconstruction does not associate with the capacity to modify walking biomechanics. Human Movement Science Research Symposium. Chapel Hill, NC. April 2022.

Bjornsen ES, Davis-Wilson H, Evans-Pickett A, Munsch AE, Blackburn JT, **Franz JR**, Pietrosimone BG. Load-dependent changes in medial femoral articular cartilage cross-sectional area are linked to differences in knee abduction moment after ACL reconstruction. Human Movement Science Research Symposium. Chapel Hill, NC. April 2022.

Evans-Pickett A, Lisee C, Blackburn JT, Padua DA, **Franz JR**, Schwartz TA, Pietrosimone B. Quadriceps strength does not associate with the capacity to modify walking biomechanics in individuals with an anterior cruciate ligament reconstruction. Human Movement Science Research Symposium. Chapel Hill, NC. April 2022.

Pimentel R, Kiefer AW, **Franz JR**. Increasing kinematic fidelity improves predictions of walking metabolic cost. Human Movement Science Research Symposium. Chapel Hill, NC. April 2021.

Shelton AD, McTaggart EM, Allen JL, Mercer VS, Crenshaw JR, **Franz JR**. Susceptibility to walking balance perturbations may generalize across contexts. Human Movement Science Research Symposium. Chapel Hill, NC. April 2022.

McTaggart EM, Shelton AD, Allen JL, Mercer VS, Crenshaw JR, **Franz JR**. Does locomotor reaction time generalize between gait imitation and walking? Human Movement Science Research Symposium. Chapel Hill, NC. April 2022.

Munsch AE, Evans-Pickett A, Davis-Wilson H, Pietrosimone B, Roth JD, **Franz JR**. Limb underloading transmits less dynamic tibiofemoral contact forces after ACLR. Human Movement Science Research Symposium. Chapel Hill, NC. April 2022.

Feldman JN, Pimentel RE, **Franz JR**. Leg joint kinetics similar between fixed-speed and self-paced treadmill walking. Human Movement Science Research Symposium. Chapel Hill, NC. April 2022.

White LT, Papachatzis N, **Franz JR**, Takahashi KZ. Shoe insole stiffness modification to augment walking in older adults. Rocky Mountain Regional American Society of Biomechanics Meeting. Estes Park, CO. April 2022.

Armitano-Lago C, Evans-Pickett A, Davis-Wilson HC, Munsch A, **Franz JR**, Blackburn JT, Pietrosimone B. Patterns of gait variability are similar between adolescent and adult patients with ACLR. ACL Research Retreat IX. Greensboro, NC. March 2022.

Ahuja S and **Franz JR**. The metabolic cost of walking balance control and adaptation in young adults. Association of Academic Physiatrists. New Orleans, LA. February 2022.

Migel KG, Cain MS, Pietrosimone BG, Blackburn JT, **Franz JR**, Song K, Jang J, Wikstrom EA. Impact of Manual Therapy on Landing Kinematics and Kinetics in People with Chronic Ankle Instability. APTA Combined Sections Meeting. San Antonio, TX. February 2022.

Funk CJ, Krupenevich RL, Sawicki GS, **Franz JR**. Exploring the functional boundaries and metabolism of triceps surae force-length relations during walking. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

\*Winner: Journal of Biomechanics Award

Ahuja S and **Franz JR**. The metabolic cost of walking balance control and adaptation in young adults. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

\*Finalist: Journal of Biomechanics Award

Baudendistel ST, **Franz JR**, Hass CJ, Real-time biofeedback to increase propulsive force in individuals with Parkinson's disease. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Baudendistel ST, Pappas M, Schmitt A, **Franz JR**, Hass CJ, Preliminary effects of propulsive force biofeedback training on overground walking in individuals with Parkinson's disease. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Beck ON, Schroeder JN, Trejo LH, **Franz JR**, Sawicki GS. Relatively shorter muscle fascicles increase the metabolic cost of cyclic force production. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Clark WH and **Franz JR**. Age-related changes to triceps surae muscle-subtendon interaction dynamics during walking. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Elie OS, **Franz JR**, Selgrade BP. Optical flow perturbation effects on standing balance in people with multiple sclerosis. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Kim H and **Franz JR**. Age-related differences in calf muscle recruitment strategies in the time-frequency domain during walking as a function of task demand. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Krupenevich RL, Takahashi KZ, Kashefsky HE, **Franz JR**. Interaction between soleus and plantar intrinsic muscle length points to a structural transmission between the human foot and ankle. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Munsch AE, Quinn ME, Pietrosimone B, **Franz JR**. Increased vastus lateralis activation at faster walking speeds preserves strut-like muscle mechanical behavior. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Pimentel RE, Feldman JN, Lewek MD, **Franz JR**. Novel clamp protocol examines cause-effect relations between propulsive force, walking speed, and cost of transport. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Pimentel RE and **Franz JR**. Does push-off intensity mediate the effects of tendon stiffness on walking metabolism? American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Shelton AD and **Franz JR**. Design of a laser-guided precision stepping system for gait and balance research. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Shelton AD, McTaggart EM, Allen JL, Mercer VS, **Franz JR**. Slowing down to preserve balance in the presence of optical flow perturbations. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2021. (Virtual/covid-19).

Clark WH and **Franz JR**. Age-related changes to triceps surae muscle-subtendon interaction dynamics during walking. International Society of Biomechanics Meeting. Stockholm, Sweden. July 2021.

Krupenevich RL, Funk CJ, **Franz JR**. Automated analysis of medical gastrocnemius muscle-tendon junction displacements in healthy young adults using deep neural networks. International Society of Biomechanics Meeting. Stockholm, Sweden. July 2021.

Munsch AE, Evans-Pickett A, Davis-Wilson H, Pietrosimone P, **Franz JR**. Effects of ACL reconstruction on *in vivo* quadriceps contractile behavior and association with knee joint biomechanics. International Society of Biomechanics Meeting. Stockholm, Sweden. July 2021.

Pimentel RE, Feldman JN, Lewek MD, **Franz JR**. Novel clamp protocol examines cause-effect relations between propulsive force, walking speed, and cost of transport. International Society of Biomechanics Meeting. Stockholm, Sweden. July 2021.

Beck ON, Schroeder JN, Trejo LH, **Franz JR**, Sawicki GS. Relatively shorter muscle lengths increase the metabolic rate of cyclic force production. International Society of Biomechanics Meeting. Stockholm, Sweden. July 2021.

Davis-Wilson HC, Pfeiffer SJ, Evans-Pickett A, **Franz JR**, Blackburn JT, Pietrosimone B. Femoral Cartilage Ultrasound Imaging Associates with T1rho Magnetic Resonance Imaging Following Anterior Cruciate Ligament Reconstruction. American College of Sports Medicine Annual Meeting, Washington DC. May 2021. (Virtual/covid-19).

Selgrade BP, Plummer P, **Franz JR**. Susceptibility to optical flow balance perturbations in older adults prevails despite cognitive distraction. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Pimentel RE, Pieper NL, Clark WH, **Franz JR**. Individual muscle metabolic energy costs associated with modifying propulsive forces in human walking. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Clark WH, Pimentel RE, **Franz JR**. Imaging and simulation of inter-muscular triceps surae contributions to forward propulsion during walking. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Conway KA, Crudup KLE, Lewek M, **Franz JR**. The effects of a 6-week horizontal impeding force training on push-off intensity in older adults. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Williams A, Clark WH, Waanders J, **Franz JR**, Blemker S, A 3D computational model to simulate 2D ultrasound measurements of medial gastrocnemius architecture. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Lehr NL, Clark WH, Lewek MD, **Franz JR**. The effects of triceps surae muscle stimulation on localized Achilles subtendon tissue displacements. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Beck ON, Gosyne J, **Franz JR**, Sawicki GS. Shorter Muscle Activation Time Increases the Metabolic Rate of Cyclic Force Generation. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Munsch AE, Roth JD, Pietrosimone B, **Franz JR**. The association between altered peak knee extensor moments and articular contact forces during walking. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Krupenevich RL, Ray SF, Clark WH, Takahashi KZ, Kashefsky HE, **Franz JR**. The effects of age and locomotor demand on foot mechanics during walking. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Krupenevich RL, Clark WH, Sawicki GS, **Franz JR**. Older adults overcome reduced triceps surae structural stiffness to preserve ankle joint quasi-stiffness during walking. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Pieper NL, Baudendistel ST, Hass CJ, Diaz GB, Krupenevich RL, **Franz JR**. The metabolic and mechanical consequences of altered propulsive force generation in walking. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Davis-Wilson HC, Hackney AC, Blackburn JT, Thoma LM, **Franz JR**, Longobardi L, Pietrosimone B. Associations between daily steps, moderate-vigorous physical activity, and femoral articular cartilage composition in individuals with anterior cruciate ligament reconstruction. American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020. (Virtual/covid-19).

Armitano-Lago CN, Pietrosimone B, Evans-Pickett A, Davis-Wilson H, **Franz JR**, Blackburn T, Kiefer AW. Feedback cueing changes in lower limb loading during gait alters underlying stride interval dynamics and intralimb coordination dynamics in individuals following anterior cruciate ligament reconstruction. Society for Chaos Theory in Psychology & Life Sciences International Meeting. Toronto, Canada. July 2020. (Virtual/covid-19).

Munsch AE, Evans-Pickett A, Davis-Wilson HC, Pietrosimone B, **Franz JR**. Effects of ACL Reconstruction on In Vivo Quadriceps Contractile Behavior during Weight Acceptance in Walking. American College of Sports Medicine Annual Meeting. San Francisco, CA. May 2020. (Virtual/covid-19).

Davis-Wilson HC, Johnston CD, Evans-Pickett A, Hackney A, Blackburn JT, Thoma L, Long L, **Franz JR**, Pietrosimone B. Fewer Steps Per Day Associates with Greater Cartilage Breakdown Biomarkers Post Anterior Cruciate Ligament Reconstruction. American College of Sports Medicine Annual Meeting. San Francisco, CA. May 2020. (Virtual/covid-19).

Armitano-Lago C, Pietrosimone B, Evans-Pickett A, Davis-Wilson HC, **Franz JR**, Blackburn JT, Kiefer A. Decreased loading during gait alters intra-limb coordination in anterior cruciate ligament reconstructed individuals. American College of Sports Medicine Annual Meeting. San Francisco, CA. May 2020. (Virtual/covid-19).

Clark WH, Pimentel RE, **Franz JR**. Imaging and simulation of inter-muscular triceps surae neuromechanics during walking. Human Movement Science Research Symposium. Chapel Hill, NC. March 2020. (Canceled/covid-19).

Beck ON, Gosyne J, **Franz JR**, Sawicki GS. Shorter muscle activation time increases the metabolic rate of cyclic force generation. Human Movement Science Research Symposium. Chapel Hill, NC. March 2020. (Canceled/covid-19).

Pieper NL, Baudendistel ST, Hass CJ, Diaz GB, Krupenevich RL, **Franz JR**. The metabolic and mechanical consequences of altered propulsive force generation in walking. Human Movement Science Research Symposium. Chapel Hill, NC. March 2020. (Canceled/covid-19).

Crudup KLE, Conway KA, **Franz JR**. The effects of a 6-week horizontal impeding force training on push-off intensity in older adults. Human Movement Science Research Symposium. Chapel Hill, NC. March 2020. (Canceled/covid-19).

Lehr NL, Clark WH, **Franz JR**. The Effects of Triceps Surae Muscle Stimulation on Localized Achilles Subtendon Tissue Displacements. Human Movement Science Research Symposium. Chapel Hill, NC. March 2020. (Canceled/covid-19).

Munsch AE, Roth JD, Pietrosimone B, **Franz JR**. The Association Between Altered Peak Knee Extensor Moments and Articular Cartilage Loading during Walking. Human Movement Science Research Symposium. Chapel Hill, NC. March 2020. (Canceled/covid-19).

Krupenevich RL, Ray SF, Clark WH, Takahashi KZ, Kashefsky HE, **Franz JR**. The effects of age and locomotor demand on foot mechanics during walking. Human Movement Science Research Symposium. Chapel Hill, NC. March 2020. (Canceled/covid-19).

Chaaban C, Davis-Wilson H, Evans-Pickett A, Munsch A, **Franz JR**, Pietrosimone B, Padua P. Association between Wearable Inertial Sensors and Laboratory-Based Ground Reaction Force Following Anterior Cruciate Ligament Reconstruction. American Physical Therapy Association Combined Sections Meeting. Denver, CO. February 2020.

Clark WH and **Franz JR**, Gastrocnemius and soleus muscle dynamics respond differently to altered propulsive demands during walking. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.

Conway KA and **Franz JR**, Shorter gastrocnemius lengths in older adults associate with reduced capacity to enhance push-off intensity in walking. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.

Selgrade BP, Meyer D, Sosnoff J, **Franz JR**, Optical flow perturbations to detect pre-clinical walking balance impairment in people with multiple sclerosis. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.



Selgrade BP, Childs M, Vander Vegt C, **Franz JR**, Aging increases reaction time during precision lateral stepping to near and distant targets during walking. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.

Waanders JB, Murgia A, Hortobágyi H, DeVita P, **Franz JR**, Ankle moment effects on hip joint angular accelerations during walking in healthy young and older adults. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.

Richards JT, Selgrade BP, Qiao M, Plummer P, Wikstrom EA, **Franz JR**, Time-dependent tuning of balance control and aftereffects following optical flow perturbation training in older adults. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.

Goodwin JS, **Franz JR**, Padua DA, Ryan ED, Schwartz, Blackburn JT, Neuromechanical contributions to lower extremity stiffness differ between single leg hopping and running. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.

Browne MG and **Franz JR**, Increasing gastrocnemius activity during walking elicits counterproductive effects on fascicle behavior in older adults. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.

Munsch M, Pietrosimone B, **Franz JR**, The effects of knee extensor moment biofeedback on gait biomechanics and quadriceps contractile behavior. International Society of Biomechanics Meeting. Calgary, Canada. August 2019.

Waanders JB, Hortobágyi T, Murgia A, DeVita P, **Franz JR**, Using induced acceleration to study the effects of age and grade on the joint moment strategy to control knee flexion during weight acceptance in walking. International Society of Posture & Gait Research World Congress. Edinburgh, Scotland. June 2019.

Pickett AE, Luc-Harkey BA, Davis HC, Blackburn JT, Seeley MK, **Franz JR**, Pietrosimone B, Manipulating peak loading during walking affects loading throughout stance in individuals with ACL reconstruction. American College of Sports Medicine Annual Meeting. Orlando, FL. May 2019.

Clark WH and **Franz JR**, Gastrocnemius and soleus muscle dynamics respond differently to altered propulsive demands during walking. Human Movement Science Research Symposium. Chapel Hill, NC. March 2019.

Conway KA and **Franz JR**, Shorter gastrocnemius lengths in older adults associate with reduced capacity to enhance push-off intensity in walking. Human Movement Science Research Symposium. Chapel Hill, NC. March 2019.

Childs M\*, Selgrade BP\*, Vander Vegt C, **Franz JR**, Aging increases reaction time during precision lateral stepping to near and distant targets during walking. Human Movement Science Research Symposium. Chapel Hill, NC. March 2019. \*equal contributions

Richards JT, Selgrade BP, Qiao M, Plummer P, Wikstrom EA, **Franz JR**, Time-dependent tuning of balance control and aftereffects following optical flow perturbation training in older adults. Human Movement Science Research Symposium. Chapel Hill, NC. March 2019.

Munsch M, Pietrosimone B, **Franz JR**, The effects of knee extensor moment biofeedback on gait biomechanics and quadriceps contractile behavior. Human Movement Science Research Symposium. Chapel Hill, NC. March 2019.

Pieper NL, Lewek MD, **Franz JR**, Can shank acceleration provide a clinically feasible surrogate for individual limb propulsion during walking? Human Movement Science Research Symposium. Chapel Hill, NC. March 2019.

Pontula A\*, Selgrade BP\*, Meyer D, Sosnoff J, **Franz JR**, The effects of optical flow perturbations on gait variability and antagonist coactivation in people with multiple sclerosis. Human Movement Science Research Symposium. Chapel Hill, NC. March 2019. \*equal contributions

Selgrade BP, Meyer DM, Sosnoff JJ, **Franz JR**, Optical flow perturbations to detect preclinical balance impairment in people with multiple sclerosis. Society for Neuroscience Annual Meeting. San Diego, CA. November 2018.

Conway KA, Bissette RG, **Franz JR**, Older adults overcome their deficits to young adults when propulsive demands of walking are increased to their maximum. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018.

Browne MG and **Franz JR**, Older adults reverse their distal-to-proximal redistribution using ankle power biofeedback. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018. \*Finalist: Doctoral Student Presentation Competition

Browne MG and **Franz JR**, Restoring propulsive forces in elderly gait does not impair dynamic stability. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018.

Clark WH and **Franz JR**, Activation-dependent changes in soleus length-tension behavior augment ankle joint quasi-stiffness. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018.

Clark WH and **Franz JR**, Triceps surae muscle-subtendon interaction differs between young and older adults. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018. \*Finalist: Doctoral Student Presentation Competition

Qiao M, Truong KN, and **Franz JR**, Does local dynamic stability during unperturbed walking predict the response to balance perturbations? An examination across age and falls history. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018.

Qiao M, Richards JT, and **Franz JR**, Visuomotor error augmentation affects mediolateral head and trunk stabilization during walking. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018.

Khanchandani A, McKenney H, Arnold B, Clark WH, **Franz JR**, The Achilles tendon moment arm exhibits independent and combinatory effects of joint rotation and muscle loading. American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018. \*Finalist: Undergraduate Student Presentation Competition

Conway KA, Bissette RG, **Franz JR**, Older adults' propulsive reserve is larger than their deficit to young adults. 8<sup>th</sup> World Congress of Biomechanics. Dublin, Ireland. July 2018.

Waanders JB, Hortobágyi T, Murgia A, DeVita P, **Franz JR**, The distal-to-proximal shift of muscle function during gait in old age is absent for negative work. 8<sup>th</sup> World Congress of Biomechanics. Dublin, Ireland. July 2018.

DeVita, P, Moulder A, Akindahunsi O, Curran C, Bell E, Knaus K, Ebrahimi A, Kuhman D, Drazen J, Paquette M, Miller R, Willy R, McNitt-Gray J, Dufek J, **Franz JR**, Darkenwald T, Breloff S, Carpes F. National Biomechanics Day: STEM Outreach for High School Students through the

21st Century's Breakthrough Science. 8<sup>th</sup> World Congress of Biomechanics. Dublin, Ireland. July 2018.

Browne MG and **Franz JR**, Older adults reverse their distal-to-proximal redistribution and walk faster with ankle power biofeedback. 8<sup>th</sup> World Congress of Biomechanics. Dublin, Ireland. July 2018.

Acuña SA, Francis CA, **Franz JR**, Thelen DG. Walking with visual perturbations but not an attention-dividing task modulates muscle coactivation patterns in old adults. XXII Congress of the International Society of Electrophysiology and Kinesiology. Dublin, Ireland. June 2018.

Song K, **Franz JR**, Karimizadehardakani M, Wikstrom EA, Influence of Optical Flow Perturbations on Gait Variability in Chronic Ankle Instability Patients. National Athletic Trainers Association Clinical Symposia. New Orleans, LA. June 2018.

Luc-Harkey, BA, **Franz, JR**, Hackney AC, Blackburn, JT, Padua, DA, Schwartz TA, Pietrosimone, B. Manipulating peak vertical ground reaction force during walking influences cartilage oligomeric matrix protein in individuals with anterior cruciate ligament reconstruction. National Athletic Trainers Association Clinical Symposia. New Orleans, LA. June 2018.

\*Doctoral Oral Award Finalist

Khanchandani A, McKenney H Arnold B, Clark WH, **Franz JR**, The Achilles tendon moment arm exhibits independent and combinatory effects of joint rotation and muscle loading. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2018.

Goodwin JS, Padua DA, Ryan ED, **Franz JR**, Schwartz TA, Blackburn JT, Knee extensor and ankle plantarflexor musculotendinous stiffness are not correlated in young healthy runners. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2018.

Clark WH and **Franz JR**, Activation-dependent changes in soleus length-tension behavior augment ankle joint quasi-stiffness. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2018.

Conway KA and **Franz JR**, Older adults' propulsive reserve during walking is larger than their deficit to young adults. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2018.

Richards JT, Qiao M, **Franz JR**, Visuomotor error augmentation affects mediolateral head and trunk stabilization during walking. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2018.

Browne MG and **Franz JR**, More push from your push-off: joint-level modifications to modulate propulsive forces in old age. Biomedical Engineering Society Meeting. Phoenix, AZ. October 2017.

Goel LD, Moore CJ, **Franz JR**, Hu X, Gallippi CM, Assessment of Anisotropy using Viscoelastic Response (VisR) Ultrasound in the Biceps Brachii of Healthy Older Adults and Stroke Patients. IEEE International Ultrasonics Symposium. Washington, DC. September 2017.

Wikstrom EA, Rhodes E, Mihalik JP, **Franz JR**, Reducing visual information via stroboscopic eyewear impairs static postural control. 7<sup>th</sup> Annual International Ankle Symposium. Chapel Hill, NC. September 2017.

Wikstrom EA, Rhodes E, **Franz JR**, Mihalik JP, CAI patients alter jump landing biomechanics differently than controls while wearing stroboscopic eyewear. 7<sup>th</sup> Annual International Ankle Symposium. Chapel Hill, NC. September 2017.

**Franz JR** and Zelik KE, Too much work: revisiting ultrasound-based estimates of Achilles tendon energy storage and return. American Society of Biomechanics Meeting. Boulder, CO. August 2017.

Clark WH and **Franz JR**, Do triceps surae muscle dynamics govern non-uniform Achilles tendon displacements? American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.

Thompson JD and **Franz JR**, Age and falls history effects on antagonist leg muscle coactivation during walking with optical flow perturbations. American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.

Conway KA and **Franz JR**, The functional utilization of propulsive capacity during human walking. American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.

Browne MG and **Franz JR**, Does dynamic stability govern propulsive force generation in human walking? American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.

Browne MG and **Franz JR**, More push from your push-off: joint-level modifications to modulate propulsive forces in old age. American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.

Qiao M, Feld JA, and **Franz JR**, Aging effects on leg joint variability during walking in the presence of optical flow perturbations. American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.

Nuckols RW, Dick TJM, **Franz JR**, Sawicki GS, Using elastic ankle exoskeletons to counteract age-related structure-function deficits. American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.

Allen JL, Thompson JD and **Franz JR**, Age and falls history effects on the modular control of walking with optical flow perturbations. American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.

**Franz JR** and Zelik KE, Too much work: revisiting ultrasound-based estimates of Achilles tendon energy storage and return. International Society of Biomechanics Meeting. Brisbane, Australia. July 2017.

Clark WH and **Franz JR**, Do triceps surae muscle dynamics govern non-uniform Achilles tendon displacements? International Society of Biomechanics Meeting. Brisbane, Australia. July 2017.

Clark WH and **Franz JR**, Do triceps surae muscle dynamics govern non-uniform Achilles tendon deformations? Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2017.

Nuckols RW, Dick TJM, **Franz JR**, Sawicki GS, Using elastic ankle exoskeletons to counteract age-related structure-function deficits. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2017.

Qiao M, Feld JA, and **Franz JR**, Aging effects on leg joint variability during walking in the presence of optical flow perturbations. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2017.

Browne MG and **Franz JR**, Does dynamic stability govern propulsive force generation in human walking? Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2017.

Conway KA and **Franz JR**, The functional utilization of propulsive capacity during human walking. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2017.

Thompson JD and **Franz JR**, Age and falls history effects on antagonist leg muscle coactivation during walking with optical flow perturbations. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. March 2017.

Browne MG and **Franz JR**, Biofeedback decouples the effects of speed and propulsive force on joint power generation in walking. American Society of Biomechanics Annual Meeting. Raleigh, NC. August 2016.

Francis CA, **Franz JR**, Acuna S, Thelen DG, Gait and balance training improves gait variability in old adults. American Society of Biomechanics Annual Meeting. Raleigh, NC. August 2016.

Rasske K, Thelen DG, **Franz JR**, Aging effects on the Achilles tendon moment arm *in vivo* during walking. American Society of Biomechanics Annual Meeting. Raleigh, NC. August 2016.

**Franz JR**, Francis CA, Allen MS, Thelen DG, Visuomotor entrainment and the control of balance in walking. American Society of Biomechanics Annual Meeting. Raleigh, NC. August 2016.

Stokes HE, Thompson JD, **Franz JR**, The association between kinematic variability and muscle activity during perturbed walking. American Society of Biomechanics Annual Meeting. Raleigh, NC. August 2016.

Thompson JD, Thelen DG, **Franz JR**, Does walking balance control adapt to perturbed optical flow? American Society of Biomechanics Annual Meeting. Raleigh, NC. August 2016.

**Franz JR**, Francis CA, Allen MS, Thelen DG, Visuomotor entrainment and the control of balance in walking. Biomechanics and Neural Control of Movement. Mt. Sterling, OH. June 2016.

Francis CA, Lenhart, RL, **Franz JR**, Kaiser J, Towles JD, Evaluation of biomechanics activities at a college-wide engineering outreach event. American Society of Engineering Education Annual Conference & Exposition. New Orleans, LA. June 2016.

Stenroth L, **Franz JR**, Thelen DG, Non-uniform *in vivo* motion of the Achilles tendon during voluntary contractions. International Sports Physiotherapy Congress. Helsinki, Finland. March 2016.

\*2<sup>nd</sup> place, Best Poster competition

Thompson JD, Thelen DG, **Franz JR**, Does walking balance control adapt to optical flow perturbations? Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. February 2016.

Browne MG, **Franz JR**, Decoupling the independent effects of walking speed and propulsive force on joint power generation in walking. Human Movement Science and Biomechanics Symposium. Chapel Hill, NC. February 2016.

**Franz JR** and Thelen DG, Achilles tendon deformations and the age-related reduction in plantarflexor performance during walking. American Society of Biomechanics Annual Meeting. Columbus, OH. August 2015.

\*ASB Awards Session (post-doc award)

**Franz JR** and Thelen DG, Modeling the aging Achilles tendon: inter-fascicle adhesions and tendon compliance affect plantarflexor behavior during walking. American Society of Biomechanics Annual Meeting. Columbus, OH. August 2015.

Rasske K, Thelen DG, **Franz JR**, Variation of the Achilles tendon moment arm during walking. American Society of Biomechanics Annual Meeting. Columbus, OH. August 2015.

Francis C, **Franz JR**, Thelen DG, Visual perturbations, but not a cognitive challenge, induce an increase in muscle coactivation during gait in healthy old adults. American Society of Biomechanics Annual Meeting. Columbus, OH. August 2015.

Orselli MI, **Franz JR**, Thelen DG, The role of Achilles tendon elasticity on triceps surae mechanics and energetics during walking. XVI Brazilian Congress of Biomechanics. Florianópolis, Santa Catarina. May 2015.

\* Certificate of Honorable Mention

Thelen DG, **Franz JR**, DeWall R, Slane LC, Quantitative ultrasonic imaging of tendon mechanics. Rehabilitation Engineering Research Center (RERC) on Technologies for Children with Orthopedic Disabilities: State of the Science. Chicago, IL. August 2014.

**Franz JR** and Thelen DG, A Simulated Shared Achilles Tendon Alters Plantarflexor Muscle Function. 7<sup>th</sup> World Congress of Biomechanics. Boston, MA. July 2014.

Orselli MI, **Franz JR**, Thelen DG, Increased Achilles tendon compliance may reduce push-off power during walking in old adults. 7<sup>th</sup> World Congress of Biomechanics. Boston, MA. July 2014.

Francis C, **Franz JR**, O'Connor SM, Thelen DG, Relative effects of visual perturbation, cognitive challenge, and restricted foot placement on step variability during walking in old and young adults. 7<sup>th</sup> World Congress of Biomechanics. Boston, MA. July 2014.

**Franz JR**, Francis CA, Allen MS, O'Connor SM, Thelen DG, Advanced age brings a reliance on visual feedback to control balance during walking. Symposium: Dynamics and stability of human movement systems. 17th US National Congress on Theoretical and Applied Mechanics. East Lansing, MI. June 2014.

**Franz JR**, Thelen DG, Kram R, Preserving walking ability with age: from biomechanical insight to evidence-based intervention. UW-Madison Institute on Aging Annual Colloquium on Aging. Madison, WI. September 2013.

**Franz JR**, Maletis M, Kram R, Real-time feedback encourages old adults to increase their propulsion during walking. American Society of Biomechanics Annual Meeting. Omaha, NE. September 2013.

**Franz JR**, Kehler A, MacDonald L, Kram R, Advanced age and the mechanics of uphill walking: a joint-level, inverse dynamic analysis. American Society of Biomechanics Annual Meeting. Omaha, NE. September 2013.

Tung KD, **Franz JR**, Kram R, A test of the metabolic cost of cushioning hypothesis in barefoot and shod running. American Society of Biomechanics Annual Meeting. Gainesville, FL. August 2012.

**Franz JR**, Kram R, How does age affect leg muscle activity/coactivity during uphill and downhill walking? Canadian Society for Biomechanics Meeting. Burnaby, BC. June 2012.

Kram R, **Franz JR**, Tung KD, Wierzbinski CM, Energetic advantages and disadvantages of running shoes. Canadian Society for Biomechanics Meeting. Burnaby, BC. June 2012.

**Franz JR**, Kehler A, MacDonald LE, Kram R, How does age affect individual leg mechanics during uphill and downhill walking? Rocky Mountain Regional American Society of Biomechanics Meeting. Boise, ID. April 2012.

Tung KD, **Franz JR**, Kram R, A test of the metabolic cost of cushioning hypothesis in barefoot and shod running. Rocky Mountain Regional American Society of Biomechanics Meeting. Boise, ID. April 2012.

**Franz JR**, Lyddon N, Kram R, The mechanics of sloped walking revisited: mechanical work performed by the individual limbs. American Society of Biomechanics Annual Meeting. Long Beach, CA. August 2011.

\*Popular Choice Award finalist

**Franz JR**, Kram R, The effects of grade and speed on leg muscle activation during walking. American College of Sports Medicine Annual Meeting. Denver, CO. June 2011.

Wierzbinski CM, **Franz JR**, Kram R, The effects of shoe mass and cushioning on the energetics of barefoot vs. shod running. Rocky Mountain Regional American Society of Biomechanics Meeting. Estes Park, CO. April 2011.

**Franz JR**, Lyddon N, Kram R, The mechanics of sloped walking revisited: mechanical work performed by the individual limbs. Rocky Mountain Regional American Society of Biomechanics Meeting. Estes Park, CO. April 2011.

Watt JR, Jackson K, **Franz JR**, Dicharry J, Della Croce U, Kerrigan DC, Effect of a supervised hip flexor-stretching program on gait in healthy elders. American Society of Biomechanics Annual Meeting. Providence, RI. August 2010.

Telhan G, Dicharry J, **Franz JR**, Kerrigan DC, Riley PO, Wilder RP, Lower limb joint kinetics during moderately sloped running: a crossover study. National Assembly of the American Academy of Physical Medicine and Rehabilitation. Seattle, WA. November 2010.

Beazell J, Hertel J, **Franz JR**, Dicharry J, Jackson KR, Kerrigan DC, Intratester and intertester agreement and reliability of the step down test. American Physical Therapy Association Combined Sections Meeting. San Diego, CA. February 2010.

Watt JR, Jackson K, **Franz JR**, Dicharry J, Kerrigan DC, Effect of a supervised hip flexor stretching program on gait in healthy elders. Italian Society for Clinical Movement Analysis Annual Meeting. Sardinia, Italy. September 2009.

Watt JR, **Franz JR**, Jackson K, Dicharry J, Riley PO, Kerrigan DC, A three-dimensional kinematic and kinetic comparison of overground and treadmill walking in healthy elderly subjects. American Society of Biomechanics Annual Meeting. State College, PA. August 2009.

Grindstaff TL, **Franz JR**, Hertel J, Kerrigan DC, Ingersoll CD, Effects of a sacroiliac joint manipulation on gait mechanics of individuals with patellofemoral joint pain. National Athletic Trainers' Association Annual Meeting & Clinical Symposia. San Antonio, TX. June 2009.

**Franz JR**, Riley PO, Dicharry J, Kerrigan DC, Changes in hip joint muscle-tendon lengths with mode of locomotion. University of Virginia Running Medicine Conference. Charlottesville, VA. April 2009.

\* Invited panel discussion member.

Grindstaff TL, **Franz JR**, Dicharry J, Beazell JR, Hertel J, Kerrigan DC, Ingersol CD, Lower extremity running mechanics of individuals with and without patellofemoral pain. University of Virginia Running Medicine Conference. Charlottesville, VA. April 2009.

**Franz JR**, Riley PO, Dicharry J, Kerrigan DC, A customized approach to partial body weight support rehabilitation in patients with post-stroke hemiparesis. Gait and Clinical Movement Analysis Society Annual Meeting. Denver, CO. March 2009.

Dicharry J, **Franz JR**, Riley PO, Wilder RP, Kerrigan DC, Open chain foot control is a function of foot structure during running. Gait and Clinical Movement Analysis Society Annual Meeting, Denver, CO. March 2009.

**Franz JR**, Dicharry J, Riley PO, Wilder RP, Kerrigan DC, Is the clinically used navicular drop test an indicator of dynamic navicular drop during walking and running? Gait and Clinical Movement Analysis Society Annual Meeting. Richmond, VA. April 2008.

Riley PO, Allaire PE, Bennett B, Bolton B, Dicharry J, **Franz JR**, Kerrigan DC, Motion analysis of BWSTT. Gait and Clinical Movement Analysis Society Annual Meeting. Richmond, VA. April 2008.

**Franz JR**, Paylo KW, Dicharry J, Riley PO, Kerrigan DC, Functionally utilized hip extension range identical during walking and running. University of Virginia Running Medicine Conference. Charlottesville, VA. March 2008.

\* Invited panel discussion member.

**Franz JR**, Wilson E, Granata KP, Quantifying standing stability using a feedback controlled balance platform. Virginia Tech Undergraduate Research Symposium. Blacksburg, VA. March 2004.