Jennifer A. Nichols

Curriculum Vitae

Assistant Professor
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Biographical Sketch: Dr. Nichols is an Assistant Professor and Pruitt Family Endowed Faculty Fellow in the J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida (UF). She has Affiliate Faculty Appointments in the Departments of Mechanical & Aerospace Engineering, Orthopaedic Surgery & Sports Medicine, and Physical Medicine & Rehabilitation. Prior to joining UF, she completed undergraduate training in mechanical engineering at Tufts University, graduate training in biomedical engineering and bioethics at Northwestern University, and postdoctoral training in orthopaedic biomechanics at University of Utah.

Research: Dr. Nichols established the Musculoskeletal Biomechanics Lab in December 2017. The guiding vision of her lab is to create predictive simulations that cross disciplinary boundaries and improve the functional ability and quality of life for individuals with musculoskeletal disorders. Her lab integrates orthopaedic biomechanics, musculoskeletal computer simulations, quantitative pain testing, medical imaging, and machine learning to understand the patient- and surgeon-specific factors that influence musculoskeletal health.

Dr. Nichols is a recognized leader in applying machine learning methods to orthopaedic biomechanics problems. This is illustrated by receipt of an Early Career Achievement Award from the American Society of Biomechanics (ASB), an Outstanding Researcher Award from the National Center for Simulation in Rehabilitation Research (NCSRR), and the Trailblazer Award from the National Institute of Biomedical Imaging and Bioengineering (NIBIB). She was also an invited speaker at the Orthopaedic Research Society (ORS) Annual meeting two years in a row due to her work to rapidly create personalized, predictive hand models using transfer learning.

Dr. Nichols is an emerging leader in understanding the interrelated nature of movement, pain, and osteoarthritis. For her work in this area, she received a National Institutes of Health (NIH) KL2 Career Development Award and a NIH R01 Research Project Grant. The translational impact of her work is best illustrated by a non-provisional patent application for a surgical product and authorship of open-source musculoskeletal modeling resources that have been used by over 550 researchers across 21 countries.

Teaching & Mentoring: Dr. Nichols' teaching focuses on biomechanics and engineering design. As highlighted in course evaluations, she effectively creates inclusive learning environments, as she is "positive and patient, allowing the students to feel comfortable asking questions", manages to "set up the course in a way that caters to all types of learners", and does "a phenomenal job at including activities... to make the material relevant."

Dr. Nichols is an effective mentor. At UF, she has mentored 6 Ph.D., 6 M.S., 4 M.D., 1 post-bachelorette, and 35 undergraduate students (includes current trainees). Of these 52 trainees, 14 (25%) are underrepresented racial minorities and/or first-generation college students, and 30 (58%) identify as female. In 2019, Dr. Nichols was recognized as an Anderson Scholar Faculty Honoree by the UF College of Liberal Arts and Sciences. This student-nominated award recognizes faculty members who have been "particularly inspiring and influential." Dr. Nichols was in the very small number of faculty who were nominated for this honor by multiple students.

Leadership & Service: At UF, Dr. Nichols was awarded the 2020 Biomedical Engineering Faculty Service Award for her role in responding to the COVID-19 pandemic. Nationally, she is an active member of the American Society of Biomechanics (ASB), where she was Founding Chair of the Early Career Faculty Affinity Group, and the Biomedical Engineering Society (BMES), where she served on the Ethics Sub-Committee. Internationally, she is a Board Member of the International Society of Biomechanics' Technical Group on Computer Simulation.

RESEARCH INTERESTS	biomechanics, musculoskeletal modeling and simulation, analysis of human movement, medical imaging (dual-fluoroscopy, CT, MRI, ultrasound), muscle and joint mechanics, pain, osteoarthritis, predictive surgical simulations, machine learning, foot/ankle, wrist/hand, research ethics

EDUCATION

Northwestern University, Evanston, IL

Ph.D., Biomedical Engineering	August 2014
M.A., Medical Humanities and Bioethics	December 2014
M.S., Biomedical Engineering	June 2011

Tufts University, Medford, MA

B.S., Mechanical Engineering	May 2008
Magna Cum Laude with High Thesis Honors	

PROFESSIONAL POSITIONS

Assistant Professor, University of Florida

J. Crayton Pruitt Family Department of Biomedical Engineering	Dec. 2017 – present
Department of Mechanical & Aerospace Engineering (affiliate)	Nov. 2018 – present
Department of Orthopaedics & Sports Medicine (affiliate)	July 2020 – present
Department of Physical Medicine & Rehabilitation (affiliate)	July 2022 – present

Research Scientist, W.O.C. Appointment, Research Service, North Florida/South Georgia Veterans Health System — March 2023 – present

Postdoctoral Research Associate, University of Utah, Department of Orthopaedic Surgery — Aug. 2014 – Nov. 2017

W.O.C. Appointment, Edward Hines Jr. VA Hospital — Feb. 2010 – Dec. 2014

HONORS AND AWARDS

National & International

Trailblazer Award — 2020
National Institute of Biomedical Imaging and Bioengineering (NIBIB)

Outstanding Researcher Award — 2018
National Center for Simulation Rehabilitation Research (NCSRR)

ASB Early Career Achievement Award — 2018
National Achievement Award for Scientists within 5-years of receiving their Ph.D.
American Society of Biomechanics

OpenSim Travel Award — 2015, 2017
National Center for Simulation Rehabilitation Research (NCSRR)

Ruth L. Kirschstein Individual National Service Award — 2012 – 2014
National Institutes of Health Pre-Doctoral Fellowship

Finalist, David Winter Young Investigator's Award — 2013
International Society of Biomechanics

HONORS AND AWARDS *continued*

Local – University of Florida

Pruitt Family Endowed Faculty Fellowship 2023 – 2026
Award recognizes excellence in teaching and research of talented junior faculty
J. Crayton Pruitt Family Dept. Biomedical Engineering, University of Florida

Biomedical Engineering Faculty Research Award 2022
Award recognizes research program with significant impact
J. Crayton Pruitt Family Dept. Biomedical Engineering, University of Florida

Shepard Broad Foundation Community Outreach Fund 2022
Competitive award to support K-12 outreach activities
J. Crayton Pruitt Family Dept. Biomedical Engineering, University of Florida

Biomedical Engineering Faculty Service Award 2020
Awarded for providing outstanding and dedicated service to the department
J. Crayton Pruitt Family Dept. Biomedical Engineering, University of Florida

Anderson Scholar Faculty Honoree 2019
Recognition via student nomination of inspiring and influential faculty mentors
University of Florida College of Liberal Arts and Sciences

Local – Prior Institutions

Leadership in Inclusive Excellence Award 2016
Awarded to Utah Postdoctoral Association (UPDA) during my tenure as Senior Chair
Office of Health Equity and Inclusion, University of Utah Health Sciences

L.S. Peery Scholar 2015
Postdoctoral Research Award
L.S. Peery Discovery Program in Musculoskeletal Research, University of Utah

Sarah Baskin Award for Excellence in Research 2012
1st Place, Graduate Student Research Category
Rehabilitation Institute of Chicago (now known as the Shirley Ryan AbilityLab)

Richard W. Jones Award 2011
Graduate Research Competition, Dept. Biomedical Engineering, Northwestern University

University Scholarship for Undergraduate Research 2007
College of Engineering, Tufts University

RESEARCH GRANTS *(ACTIVE)*

NIH R01 04/01/22 – 03/31/27
Carpometacarpal Osteoarthritis: Understanding the Intersection of Muscle Mechanics, Joint Instability, and Pain
Agency: National Institutes of Health (NIH NIAMS)
PI: Jennifer A. Nichols; co-I: Yenisel Cruz-Almeida, Terrie Vasilopoulos, Thomas Wright
Amount: $1,848,783 Direct Cost

RESEARCH GRANTS *(ACTIVE) continued*

NIH R25 06/01/22 – 02/28/27
Team-Based Design for Clinical Translation
Agency: National Institutes of Health (NIH NIBIB)
PI: Eric Fuller & W. Lee Murfee
Mentors: Kyle Allen, Jennifer Nichols, Blanka Sharma, Lakiesha Williams
Amount: $216,000 Total Cost

NIH R01 09/15/22 – 09/14/25
Elucidating Principles of Sensorimotor Control Using Deep Learning
Agency: National Institutes of Health (NIH NIDA)
PI: Shreya Saxena; co-I: Jennifer A. Nichols, Mark Churchland, Rui Costa
Amount: $ 712,500 Direct Cost

NIH R21 Trailblazer Award 09/01/20 – 08/31/23
A Transfer Learning Framework for Creating and Interpreting Subject-Specific Musculoskeletal Models of the Hand
Agency: National Institutes of Health (NIH NIBIB R21Trailblazer)
PI: Jennifer A. Nichols; co-I: Joel B. Harley
Amount: $400,000 Direct Cost

RESEARCH GRANTS *(COMPLETED)*

NIH KL2 Multidisciplinary Scholar Program 07/01/19 – 06/30/22
Carpometacarpal Osteoarthritis: Towards Identification of Biomechanical, Neuromuscular, and Somatosensory Mechanisms
Agency: National Institutes of Health (NIH NCATS KL2TR001429)
PI: Jennifer A. Nichols
Amount: $243,700 Direct Cost

ORS/OREF Postdoctoral Fellowship Grant July 2016 – Sept. 2017
Evaluating Hindfoot Biomechanics to Improve Function Following Tibiotalar Arthrodesis
Agency: Orthopaedic Research Society (ORS) & Orthopaedic Research & Education Foundation (OREF)
PI: Jennifer A. Nichols; Research Mentor: Andrew E. Anderson
Amount: $50,000 Direct Cost

NIH NRSA F31 – Predoctoral Fellowship March 2012 – Aug. 2014
Surgical Simulations to Optimize the Treatment of Wrist Osteoarthritis
Agency: National Institutes of Health, NRSA (F31 AG041627)
PI: Jennifer A. Nichols; Research Mentor: Wendy Murray
Amount: $103,950 Direct Cost

NIH T32 – Predoctoral Trainee Fellowship March 2010 – Feb. 2012
Pathophysiology and Rehabilitation of Neural Dysfunction
Agency: National Institutes of Health (T32 HD07418)
PI: W. Zev Rymer and Eric Perreault; Trainee: Jennifer A. Nichols

TEACHING EXPERIENCE

Primary Instructor – University of Florida

Note: Teaching effort was restricted Fall 2019 to Spring 2022 due to KL2 Award.

BME 3012: Clinically-Inspired Engineering Design
Undergraduate, required third-year course

- Spring 2023
  - *Enrolled*: 86 students
  - *Format*: in-person; 50-minute and 115-minute class period each week
- Fall 2021*
  - *Enrolled*: 47 students
  - *Format*: hybrid, co-taught; 50-minute and 115-minute class period each week
- Fall 2020
  - *Enrolled*: 39 students
  - *Format*: online; 50-minute and 115-minute class period each week
- Spring 2020
  - *Enrolled*: 80 students
  - *Format*: in-person & online; 50-minute and 115-minute class period each week
- Spring 2019
  - *Enrolled*: 36 students
  - *Format*: in-person; 50-minute and 115-minute class period each week

*****Co-taught due to parental leave October – December 2021

BME 3219: Engineering Analysis of Musculoskeletal Biomechanics
Undergraduate, upper-division elective

- Fall 2022
  - *Enrolled*: 7 students
  - *Format*: in-person; 50-minute and 115-minute class period each week
- Spring 2018
  - *Enrolled*: 10 students
  - *Format*: in-person; 50-minute and 115-minute class period each week

BME 6938: Computer Methods in Musculoskeletal Biomechanics
Graduate, elective

- Spring 2022
  - *Enrolled*: 16 students
  - *Format*: in-person; 50-minute and 115-minute class period each week

Guest Lectures – University of Florida

BME 1008: Intro. to Biomedical Engineering
Undergraduate, required first- or second-year course

- Introduction to Engineering Design
  - Spring 2023
  - Fall 2022
  - Spring 2022
  - Spring 2021
  - Fall 2020
  - Spring 2020
  - Fall 2019

TEACHING EXPERIENCE *continued*

- Research Overview: Biomechanics & Bionics
  - Fall 2022
- Research Overview: Biomedical Data Science & Modeling
  - Fall 2022
- Lab Overview: Musculoskeletal Biomechanics Lab
  - Spring 2021
  - Fall 2020
  - Spring 2020
  - Fall 2019
  - Spring 2019

BCH 4905: Science for Life Research Course
Undergraduate, elective first-year course
- Fall 2020
- Fall 2018

SSTP Lecture: Student Science Training Program
High School, summer program lecture series
- Summer 2019

EGN 6933: Engineering Faculty Development
Graduate, elective
- Spring 2019

Guest Lectures – Other Institutions

ME EN 7120: Functional Anatomy for Engineers, Univ. of Utah — Spring 2015
NUIN 490: Responsible Conduct of Research, Northwestern Univ. — Summer 2013

Supervised Teaching Experience

PHTH 6040: Gross Anatomy, University of Utah — Summer 2016
BME 371: Mechanics of Biological Tissues, Northwestern University — Winter 2014
Foundations of Clinical Ethics, Feinberg School of Medicine — Fall 2013
BME 307: Quantitative Experimentation & Design, Northwestern Univ. — Spring 2012

PROFESSIONAL DEVELOPMENT *(selected)*

Teaching & Mentoring Certificate Programs

Mentor Academy, Clinical & Translational Science Institute, University of Florida — Spring 2022

First Year Faculty Teaching Academy, Office of Development & Teaching Excellence, University of Florida — Spring 2018

Certificate Program, Searle Center for Advancing Learning & Teaching, Northwestern University — 2013 – 2014

PROFESSIONAL DEVELOPMENT *(selected) continued*

Research Training Programs

Osteoarthritis Fellows in Training Bootcamp, Sept. 2019
Arthritis Foundation, Chicago, IL

Competitive Grant Writing Workshops

TIGRR Workshop Jan. 2019
Training in Grantsmanship for Rehabilitation Research

Young Investigator Initiative Oct. 2018
U.S. Bone & Joint Initiative

OPEN-SOURCE MODELS, DATA, & SOFTWARE

ARMS Lab Hand and Wrist Model
https://simtk.org/projects/arms_hand_model

Available Downloads:
- ARMS model and tutorial for OpenSim 4.3 (2021)
- ARMS model and tutorial for OpenSim 3.3 (2021)

Thumb-Tip Force during Lateral Pinch
https://simtk.org/projects/thumb-force

Available Downloads:
- Kearney, K.M., J.B. Harley, J.B., and J.A. Nichols. (2021) "Kearney 2021 Lateral Pinch Data" doi: 10.18735/2y6b-5e15

Nonimpaired and Surgically Salvaged Wrists
https://simtk.org/projects/wristsalvage

Available Downloads:
- Nichols, J.A., M.S. Bednar, and W.M. Murray. (2016) "Limited Data PRC Model." doi: 10.18735/S51599
- Nichols, J.A., M.S. Bednar, and W.M. Murray. (2016) "Limited Data SE4CF Model." doi: 10.18735/S5WC7C
- Nichols, J.A., M.S. Bednar, and W.M. Murray. (2016) "Wrist & Thumb Moment Arm Data Set." doi: 10.18735/S5WC7C

PATENTS

J.A. Nichols and C.W. Reb, “Method, Apparatus, and Computer Program Product for Bone Alignment for Syndesmosis Fixation," U.S. Non-Provisional Application No. 16/649,839. February 3, 2022.

DISSERTATION & THESES

Nichols, J.A. (2014) "Wrist Biomechanics Influence Hand Function: Computer Simulations and Cadaveric Experiments of Nonimpaired and Surgically Salvaged Wrists" *Ph.D. Dissertation* (Advisor: Wendy M. Murray), Northwestern University, Evanston, IL.

Nichols, J.A. (2014) "The Translation Gap Between Science and Surgery: A Perspective on the Social, Ethical, and Legal Challenges Impacting Surgical Innovation" *M.A. Thesis* (Advisor: Katie Watson), Northwestern University, Chicago, IL

Nichols, J.A. (2011) "Understanding the Implications of Simplifying the Kinematics of the Wrist: A Biomechanical Analysis of Orthopaedic Wrist Surgeries" *M.S. Thesis* (Advisor: Wendy M. Murray), Northwestern University, Evanston, IL.

Nichols, J.A. (2008) "Fluid Mechanics of Bone: A Characterization of the Fluid Properties of a Silk Scaffold Used to Develop Synthetic Bone Grafts" *Undergraduate Honors Thesis* (Advisor: Richard Wlezien), Tufts University, Medford, MA.

JOURNAL PUBLICATIONS

1. **Nichols, J.A.,** C.E. Baratta, and C.W. Reb (2023) "Biomechanical Sequelae of Syndesmosis Injury and Repair" *Foot & Ankle Clinics.* 28(1): 77-88. https://doi.org/10.1016/j.fcl.2022.10.004
2. Rakauskas T.R., S.M. Barron, T. Ordonez Diaz, and **J.A. Nichols**. (2023) "Measuring Fascicle Lengths in Extrinsic and Intrinsic Thumb Muscles Using Extended Field-of-View Ultrasound" *Journal of Biomechanics.* 149: 111512. https://doi.org/10.1016/j.jbiomech.2023.111512
3. McFarland D.C., B. I. Binder-Markey, **J. A. Nichols**, S. J. Wohlman, M. de Bruin, and W. M. Murray. (2022, epub ahead of print) "A Musculoskeletal Model of the Hand and Wrist Capable of Simulating Functional Tasks" *IEEE Transactions on Biomedical Engineering.* https://doi.org/10.1109/tbme.2022.3217722
4. Heifner, J., J. Kilgore III, **J.A. Nichols**, and C.W. Reb (2022, epub ahead of print) "Syndesmosis Injury Imparts a Large Negative Effect on Patient-Reported Outcomes: a Systematic Review" *Foot & Ankle Specialist.* https://doi.org/10.1177/19386400211067865
5. Hao, K.A., R.A. Vander Griend, **J.A. Nichols**, and C.W. Reb. (2022) "Intraoperative Assessment of Reduction of Ankle Syndesmosis" *Current Reviews in Musculoskeletal Medicine*. 15. 344-352. https://doi.org/10.1007/s12178-022-09769-0
6. McFarland, D.C., **J.A. Nichols**, M.S. Bednar, S.J. Wohlman, and W.M. Murray (2022) "Corrigendum to 'Connecting the wrist to the hand: A simulation study exploring changes in thumb-tip endpoint force following wrist surgery' [J. Biomech. 58 (2017) 97-104]" *Journal of Biomechanics.* 139: 110859. https://doi.org/10.1016/j.jbiomech.2021.110859
7. Barron, S.M., T. Ordonez Diaz, F. Pozzi, and **J.A. Nichols** (2022) "Linear Relationship Between Electromyography and Shear Wave Elastography Measurements in the Upper Extremity Persists in Deep Muscles" *Journal of Electromyography & Kinesiology.* 63:102645. https://doi.org/10.1016/j.jelekin.2022.102645

8. McFarland D.C., B. I. Binder-Markey, **J. A. Nichols**, S. J. Wohlman, M. de Bruin, and W. M. Murray. (2021) "A Musculoskeletal Model of the Hand and Wrist Capable of Simulating Functional Tasks" *bioRxiv.* 2021.12.28.474357. https://doi.org/10.1101/2021.12.28.474357

9. Kearney, K., J.B. Harley, and **J.A. Nichols** (2021) "Classifying Muscle Parameters with Artificial Neural Networks and Simulated Lateral Pinch Data" *PLoS One.* 16(9): e0255103. https://doi.org/10.1371/journal.pone.0255103

10. Ordonez Diaz, T. and **J.A. Nichols** (2021) "Anthropometric Scaling of Musculoskeletal Models of the Hand Captures Age-Dependent Differences in Lateral Pinch" *Journal of Biomechanics.* 123: 110498. https://doi.org/10.1016/j.jbiomech.2021.110498

11. Hao, K. and **J.A. Nichols** (2021) "Simulating Finger-Tip Force Using Two Common Contact Models: Hunt-Crossley and Elastic Foundation" *Journal of Biomechanics*. 119: 110334. https://doi.org/10.1016/j.jbiomech.2021.110334

12. Roach, K.E., K.B. Foreman, B.A. MacWilliams, K. Karpos, **J.A. Nichols,** and A.E. Anderson. (2021) "The modified Shriners Hospitals for Children Greenville (mSHCG) multi-segment foot model provides clinically acceptable measurements of ankle and midfoot angles: A dual fluoroscopy imaging study" *Gait & Posture*. 85: 258-265. https://doi.org/10.1016/j.gaitpost.2021.02.004

13. Haupt E.T., J.G. Monir, M. Mansfield, A. Pollizzi, **J.A. Nichols**, and C.W. Reb. (2020) "Computed Tomography Validation of the Center-Center Radiographic Technique for Syndesmosis Fixation Axis Alignment" *Foot & Ankle International.* 41(9): 1143-1148. https://doi.org/10.1177/1071100720936215

14. Charles, J. and **J.A. Nichols** (2020) "Assessing the Validity of Ultrasound Imaging of Wrist Muscle Moment Arms through an Agar Phantom Experiment and In Vivo Case Study" *UF Journal of Undergraduate Research*. 22 (Fall). https://doi.org/10.32473/ufjur.v22i0.120555

15. Lenz, A.L., **J.A. Nichols,** K.E. Roach, K.B. Foreman, A. Barg, C.L. Saltzman, and A.E. Anderson. (2020) "Compensatory Motion of the Subtalar Joint Following Tibiotalar Arthrodesis: An In-Vivo Dual-Fluoroscopy Imaging Study" *Journal of Bone & Joint Surgery.* 102(7): 600-609. https://doi.org/10.2106/JBJS.19.01132

16. **Nichols, J.A.**, K.B. Foreman, A. Barg, C.L. Saltzman, and A.E. Anderson. (2019) "Ankle Strength, Muscle Size, and Adipose Content Following Unilateral Tibiotalar Arthrodesis" *Journal of Orthopaedic Research*. 37(5):1143-1152 https://doi.org/10.1002/jor.24282

17. Martin, J.C. and **J.A. Nichols** (2018) "Simulated Work-Loops Predict Maximal Human Cycling Power." *Journal of Experimental Biology*. 10:221(Pt 13) http://doi.org/10.1242/jeb.180109

18. **Nichols, J.A.**, K.E. Roach, N.M. Fiorentino, and A.E. Anderson. (2017) "Subject-Specific Axes of Rotation Based on Talar Morphology Do Not Improve Predictions of Tibiotalar and Subtalar Joint Kinematics." *Annals of Biomedical Engineering.* 45(9): 2109-2121. http://doi.org/10.1007/s10439-017-1874-9

19. **Nichols, J.A.**, M.S. Bednar, S.J. Wohlman, and W.M. Murray. (2017) "Connecting the Wrist to the Hand: A Simulation Study Examining Changes in Thumb-Tip Endpoint Force Following Wrist Surgery." *Journal of Biomechanics.* 58: 97-104. https://doi.org/10.1016/j.jbiomech.2017.04.024
20. **Nichols, J.A.**, M.S. Bednar, R.M. Havey, and W.M. Murray. (2017) "Decoupling the Wrist: A Cadaveric Experiment Examining Wrist Kinematics Following Midcarpal Fusion and Scaphoid Excision." *Journal of Applied Biomechanics.* 33(1): 12-23. http://dx.doi.org/10.1123/jab.2015-0324
21. **Nichols, J.A.**, K.E. Roach, N.M. Fiorentino, and A.E. Anderson. (2016) "Predicting Tibiotalar and Subtalar Joint Angles from Skin-Marker Data with Dual-Fluoroscopy as a Reference Standard." *Gait & Posture* 49:136-143. http://dx.doi.org/10.1016/j.gaitpost.2016.06.031
22. **Nichols, J.A.**, M.S. Bednar, and W.M. Murray. (2016) "Surgical Simulations Based on Limited Quantitative Data: Understanding How Musculoskeletal Models Can Be Used to Predict Moment Arms and Guide Experimental Design." *PLoS ONE*. 11(6): e0157346. http://dx.doi.org/10.1371/journal.pone.0157346
23. **Nichols, J.A.**, M.S. Bednar, R.M. Havey, and W.M. Murray. (2015) "Wrist Salvage Procedures Influence Moment Arms of the Primary Wrist Muscles." *Clinical Biomechanics* 30(5):424-430. http://dx.doi.org/10.1016/j.clinbiomech.2015.03.015.
24. **Nichols, J.A.**, M.S. Bednar, and W.M. Murray. (2013) "Orientations of Wrist Axes of Rotation Influence Torque to Hold the Hand Against Gravity: A Simulations Study of the Nonimpaired and Surgically Salvaged Wrist." *Journal of Biomechanics.* 46(1): 192-196. http://dx.doi.org/10.1016/j.jbiomech.2012.10.0355.

JOURNAL PUBLICATIONS *(IN REVIEW & IN REVISION)*

1. Kearney, K., J. B. Harley, and **J.A. Nichols** (in revision) "Inverse Distance Weighting to Rapidly Generate Large Simulation Datasets" *Journal of Biomechanics.*
2. Lindbeck, E.M., M.T. Diaz, **J.A. Nichols**, and J.B. Harley (in revision) "Predicting Thumb, Hand, and Arm Muscle Parameters with Machine Learning Models and Force Measurements of Varying Complexity" *Journal of Biomechanics.*
3. Ordonez Diaz T., R. Fillingim, Y. Cruz-Almeida, and **J.A. Nichols** (in review) "Comparison of Experimental Pain and Functional Impact in Individuals with Single- and Multi-Site Osteoarthritis" *Osteoarthritis & Cartilage.*
4. Jackson, N.J., K. Flores, A. Blake, J.B. Harley, C.W. Reb, and **J.A. Nichols** (in review) "The Center-Center Surgical Navigation Strategy Achieves Patient-Specific Alignment for Syndesmotic Fixation" *Foot & Ankle Specialist.*
5. Tappan, I., E.M. Lindbeck, **J.A. Nichols**, and J.B. Harley (in review) "Elucidating Relationships in Hand Musculoskeletal Biomechanics Simulations with Explainable Artificial Intelligence" *Annals of Biomedical Engineering.*
6. Heifner, J., **J.A. Nichols**, and C.W. Reb (in review) "Syndesmosis Malreduction is Rarely Predictive of Revision Surgery: a Systematic Review" *Foot & Ankle Specialist.*

JOURNAL PUBLICATIONS *(IN PREP)*

1. Ordonez Diaz, T., K. Hao, T.R. Rakauskas, and **J.A. Nichols**. (in prep) "The Need for Standardized Pain Measurement in Biomechanics Research: A Review of the Hand Osteoarthritis Literature" *Clinical Biomechanics.*
2. Baratta, C.E., J.L. Zermeno, C.W. Reb, and **J.A. Nichols**. "Inclusion of a Visual Aid Improves Image Interpretation Accuracy when Evaluating Tibiofibular Alignment using Fluoroscopy" (in prep) *Clinical Orthopaedics and Related Research.*
3. Diaz, M.T., J.B. Harley and **J.A. Nichols** (in prep) "Sensitivity Analysis of Upper Limb Model Parameters During Isometric and Isokinetic Tasks" *Journal of Biomechanics.*
4. Ordonez Diaz, T., T. Vasilopoulos, T.W. Wright, Y. Cruz-Almeida, and **J.A. Nichols** (in prep) "Experimental Pain and Psychological Questionnaires in Participants with Carpometacarpal Osteoarthritis" *Osteoarthritis & Cartilage*

PEER-REVIEWED CONFERENCE PROCEEDINGS & ABSTRACTS

1. Johnson, A.J., **J.A. Nichols**, H.K. Vincent, R.B. Fillingim, and Y. Cruz-Almeida (2023) "Myogenic Contributors to Physical Function in Older Adults with Symptomatic Knee Osteoarthritis" Under review for *Gerontology Society of America*. Tampa, FL.
2. Baron, S.M., J.J. King, F. Pozzi, and **J.A. Nichols** (2023) "From Subtle to Severe: Mapping the Continuum of Symptom Expression in Rotator Cuff Tears with Biomechanics" Under review for *American Society of Biomechanics*, Knoxville, TN.
3. Diaz, M.T., J.B. Harley, and **J.A. Nichols** (2023) "Do Biomechanists Represent the General Population? An Investigation of Selection Bias and Hand Function" Under review for *American Society of Biomechanics*. Knoxville, TN.
4. Kearney, K.M., T. Ordonez Diaz, J.B. Harley, and **J.A. Nichols** (2023) "Transfer Learning with Simulated and Recorded Data Improves Predictions of Upper Extremity Biomechanics" Podium at *International Society of Biomechanics*, Fukuokoa, Japan
5. Ordonez Diaz, T., K.M. Kearney, T.W. Wright, and **J.A. Nichols** (2023) "Do Muscle Activity Patterns Vary According to the Severity of Carpometacarpal Osteoarthritis Disease?" Podium at *International Society of Biomechanics*, Fukuokoa, Japan. ***Finalist Clinical Biomechanics Award***
6. Urquia, J., F. Campos, T. Ordonez Diaz, T.W. Wright, and **J.A. Nichols** (2023) "Applying a Simulation Pipeline to Identify Kinematic and Kinetic Differences Between Individuals with Early- and End-Stage Carpometacarpal Osteoarthritis" Podium at *XIX International Symposium on Computer Simulation in Biomechanics*, Kyoto, Japan
7. Kearney, K.M., T Ordonez Diaz, J.B. Harley, and **J.A. Nichols** (2023) "From Simulation to Reality: Predicting Torque with Fatigue Onset via Transfer Learning" Podium at *XIX International Symposium on Computer Simulation in Biomechanics*, Kyoto, Japan.
8. Ordonez Diaz, T., T. Vasilopoulos, T.W. Wright, Y. Cruz-Almeida, and **J.A. Nichols** (2023) "Experimental Pain and Psychological Differences Between Individuals with Early- and End-Stage Carpometacarpal Osteoarthritis" Poster at *Osteoarthritis*

Research Society International (OARSI) World Congress on Osteoarthritis, Denver, CO.

9. Root, K.T., Jackson, N.J., **J.A. Nichols**, and C.W. Reb (2023) "Sagittal Plane Limb Rotation Alters Apparent Fibula Length on Ankle Radiographs" Poster at *Orthopaedic Research Society (ORS) Annual Meeting*. Dallas, TX.
10. Hao, K.A., T. Ordonez Diaz, T.R. Rakauskas, and **J.A. Nichols** (2023) "The Need for Standardized Pain Measurements in Orthopaedic Biomechanics Research: A Systematic Review of the Hand Osteoarthritis Literature" Poster at *Orthopaedic Research Society (ORS) Annual Meeting*. Dallas, TX.
11. Baringer, K.D., C.E. Baratta, C.W. Reb, and **J.A. Nichols** (2022). "Comparing Kinematics of OpenSim Multi-Segment Foot Models During Low- and High-Demand Tasks" Podium at *Biomedical Engineering Society (BMES) Annual Meeting.* San Antonio, TX.
12. Ordonez Diaz, T., S. Licht, Y. Cruz-Almeida, and **J.A. Nichols** (2022). "Reduced Range of Motion and Higher Movement-Evoked Pain in Individuals with Carpometacarpal Osteoarthritis" Poster at *North American Congress on Biomechanics (NACOB)*. Ottawa, Canada.
13. Baratta, C.E., K.D. Baringer, C.W. Reb, and **J.A. Nichols** (2022). "Modeling Fibular Kinematics Using Skin Marker Motion Capture" Poster at *North American Congress on Biomechanics (NACOB)*. Ottawa, Canada.
14. Barron, S.M., T. Ordonez Diaz, M.T. Diaz, F. Pozzi, and **J.A. Nichols** (2022). "Inter-Operator Reliability of Fine-Wire Electromyography in the Evaluation of Eccentric Elbow Flexor Activity" Poster at *North American Congress on Biomechanics (NACOB)*. Ottawa, Canada.
15. Diaz, M., J.B. Harley and **J.A. Nichols** (2022). "Does Mass Influence Predicted Muscle Activation in Upper Limb Isometric Tasks?" Poster at *North American Congress on Biomechanics (NACOB)*. Ottawa, Canada.
16. Kearney, K., J.B. Harley, and **J.A. Nichols** (2022). "Opening the Black Box: Using Explainable AI to Understand What a Neural Network Learns from Lateral Pinch Simulations" Podium at *North American Congress on Biomechanics (NACOB)*. Ottawa, Canada.
17. Tappan, I., E.M. Lindbeck, **J.A. Nichols**, and J.B. Harley (2022). "Examining Machine Learning Classifications with Explainable AI Aids Interpretation of Wrist Biomechanics" Podium at *North American Congress on Biomechanics (NACOB)*. Ottawa, Canada.
18. Lindbeck, E.M., M.T. Diaz, **J.A. Nichols**, and J.B. Harley (2022). "Creating Personalized Thumb Models from Sparse Simulation Datasets Using Deep Learning" Podium at *North American Congress on Biomechanics (NACOB)*. Ottawa, Canada.
19. Ordonez Diaz T., Y. Cruz-Almeida, R. Fillingim and **J. A. Nichols** (2022) "Comparison of experimental pain and functional impact in individuals with single- and multi-site osteoarthritis" Poster at *U.S. Association for the Study of Pain (USASP) Annual Scientific Meeting*. Cincinnati, OH.

20. Reb, C.W., C.E. Baratta, C.E., J.L. Zermeno, and **J.A. Nichols** (2022) "Accurate Assessment of Tibiofibular Alignment and Mental Workload are Improved by Inclusion of a Visual Aid on Center-Center X-rays" Podium at *American Academy of Orthopaedic Surgeons (AAOS) Annual Meeting.* Chicago, IL.
21. Baratta, C.E., J.L. Zermeno, K.D. Baringer, C.W. Reb, and **J.A. Nichols** (2022) "Inclusion of a Visual Aid Improves Surgeon and Trainee Accuracy when Evaluating Images for Ankle Syndesmosis Repair." Podium at *American Orthopaedic Foot & Ankle Society (AOFAS) Winter Meeting*. Phoenix, AZ.
22. Ordonez Diaz, T., S. Licht, K.A. Hao, Y. Cruz-Almeida, and **J.A. Nichols** (2022) "Simultaneous Measurement of Muscle Activity, Kinetics, and Pain in Women with Carpometacarpal Osteoarthritis." Poster at *Orthopaedics Research Society (ORS) Annual Meeting.* Tampa, FL.
23. Jackson, N.J., C.W. Reb, J.B. Harley, and **J.A. Nichols** (2022) "A 3D Image-Based Comparison of the Center-Center and Transyndesmotic Axis Methods for Patient-Specific Fixation of the Ankle Syndesmosis." Poster at *Orthopaedics Research Society (ORS) Annual Meeting.* Tampa, FL.
24. Baratta, C.E., J.L. Zermeno, C.W. Reb, and **J.A. Nichols (**2022) "Evaluating Orthopaedic Surgeon Accuracy and Cognitive Effort when Assessing Center-Center Images for Ankle Syndesmosis Fixation." Poster at *Orthopaedics Research Society (ORS) Annual Meeting.* Tampa, FL.
25. Barron, S.M., F. Pozzi, and **J.A. Nichols** (2021) "Common Shoulder Models Perform Best in Frontal Plane when Studying Glenohumeral Joint Mechanics." Poster at *Biomedical Engineering Society (BMES) Annual Meeting.* Hybrid Format. Orlando, FL.
26. Heifner, J., **J.A. Nichols**, and C.W. Reb (2021) "The Prognostic Value of Syndesmosis Malreduction for Revision Surgery; a Systematic Review." Poster at *American Orthopaedic Foot & Ankle Society (AOFAS) Annual Meeting*. Charlotte, NC.
27. Heifner, J., J.E. Kilgore, **J.A. Nichols**, and C.W. Reb (2021) "Syndesmosis Injury Imparts a Large Negative Effect on Patient Reported Outcomes: a Systematic Review." Poster at *American Orthopaedic Foot & Ankle Society (AOFAS) Annual Meeting*. Charlotte, NC.
28. Heifner, J., J.E. Kilgore, J.A. Nichols, and C.W. Reb (2021) "Syndesmosis Injury Imparts a Large Negative Effect on Patient Reported Outcomes: a Systematic Review" Podium at *American Academy of Orthopaedic Surgery (AAOS) Annual Meeting*. San Diego, CA.
29. Diaz, M.T., J.B. Harley, and **J.A. Nichols** (2021) "Influence of Upper Limb Model Parameters in Isometric and Isokinetic Tasks" Thematic Poster at *American Society of Biomechanics (ASB) Annual Meeting.* Virtual Format.
30. Rakauskas, T., T. Ordonez Diaz, and **J.A. Nichols** (2021) "Measuring Fascicle Lengths in Extrinsic and Intrinsic Thumb Muscles Using Extended Field-of-View

Ultrasound" Thematic Poster at *American Society of Biomechanics Annual Meeting.* Virtual Format.

31. Jackson, N.J., C.W. Reb, J.B. Harley, and **J.A. Nichols** (2021) "Computational Comparison of Center-Center and Centroid Axes in Syndesmosis Fixation" Poster at *Orthopaedic Research Society (ORS) Annual Meeting*. Virtual Format.
32. Barron, S., T. Ordonez Diaz, F. Pozzi, and **J.A. Nichols** (2021) "Assessment of Superficial and Deep Muscle Activity in the Upper Extremity Using Ultrasound Shear Wave Elastography" Podium at *Orthopaedic Research Society (ORS) Annual Meeting*. Virtual Format.
33. Kearney, K.,G J.B. Harley, and **J.A. Nichols** (2021) "Inverse Distance Weighting to Rapidly Generate Large Simulation Datasets" Podium at *International Society of Biomechanics (ISB).* Virtual Format.
34. Ordonez Diaz, T.G and **J.A. Nichols** (postponed to 2021) "Evaluating Anthropometrically Scaled Models of Lateral Pinch to Characterize the Pediatric Hand" Poster at *Hand & Wrist Biomechanics International (HWBI) in conjunction with the International Society of Biomechanics (ISB)*. Virtual Format.
35. Kearney, K.,G J.B. Harley, and J.A. Nichols (postponed to 2021) "Learning from the Measurable: Predicting Changes in Hill-Type Muscle Parameters from Lateral Pinch" Poster at *Hand & Wrist Biomechanics International (HWBI) in conjunction with the International Society of Biomechanics (ISB).* Virtual Format.
36. Lenz, A.L, **J.A. Nichols**, K.E. Roach, R.J. Lisonbee, K.B. Foreman, A. Barg, C.L. Saltzman, and A.E. Anderson (postponed to 2021) "Contralateral Ankle Complex Kinematic Compensations After Unilateral Tibiotalar Arthrodesis" Podium at *International Foot and Ankle Biomechanics (i-FAB) Community.* Virtual Format.
37. Hilton, T., and **J.A. Nichols** (2020) "Comparing Two Motion Capture Marker Sets for Measuring Thumb Kinematics." Poster at *Biomedical Engineering Society (BMES) Annual Meeting*. Virtual Format.
38. Morales Y., C.W. Reb, and **J.A. Nichols** (2020) "Incorporating Fibular Kinematics into Musculoskeletal Computer Models to Evaluate Ankle Syndesmosis Injury Mechanisms" Poster at *Biomedical Engineering Society (BMES) Annual Meeting*. Virtual Format.
39. Moran, K., and **J.A. Nichols** (2020) "Simulations Capture Relationship between Upper Limb Posture and Thumb-Tip Force" Poster at *Biomedical Engineering Society (BMES) Annual Meeting*. Virtual Format.
40. Bassi, Y., J.B. Harley, and J**.A. Nichols** (2020) "Module-Based Analysis of Upper-Limb Movement Post-Stroke" Poster at *Biomedical Engineering Society (BMES) Annual Meeting*. Virtual Format.
41. Barnes, D., and **J.A. Nichols** (2020) "Supraspinatus Produces Highest Muscle Force as Glenohumeral Joint Force Increases with Speed." Poster at *Biomedical Engineering Society (BMES) Annual Meeting*. Virtual Format.

42. Gibby, G., D. Lizdas, W.T. Johnson, S. Niemi, I. Zaour, S. Kiley, **J.A. Nichols**, P. Tighe, and S. Lampotang (2020) "Design, Build, and Evaluation of a Low-Cost, Pandemic Ventilator Using Non-Ventilator Supply Chain Parts" *American Society of Anesthesiologists Annual Meeting.* Virtual Format.
43. Kearney, K., J.B. Harley, and **J.A. Nichols** (2019) "Classifying Muscle Parameters with Long-Short Term Memory Networks and Simulated Lateral Pinch Data." Podium at *Biomedical Engineering Society (BMES) Annual Meeting,* Philadelphia, PA.
44. Flores, K., J.B. Harley, and **J.A. Nichols** (2019) "Predicting Lower Limb Muscle Strength with Feed Forward Neural Networks." Podium at *Biomedical Engineering Society (BMES) Annual Meeting,* Philadelphia, PA.
45. Smith, C.P. and **J.A. Nichols** (2019) "Design and Calibration of a Custom Force Sensor for Application in Pinch Force Measurement." Podium at *Biomedical Engineering Society (BMES) Annual Meeting,* Philadelphia, PA.
46. Diaz-Portela, P. and **J.A. Nichols** (2019) "A Motion Capture Study to Analyze Finger Joint Coordination During Daily Tasks." Poster at *Biomedical Engineering Society (BMES) Annual Meeting, Philadelphia*, Philadelphia, PA.
47. Ordonez Diaz, T. and **J.A. Nichols** (2019) "Evaluating Lateral Pinch Force Across the Lifespan through Scaled Musculoskeletal Models of the Hand." Poster at *Biomedical Engineering Society (BMES) Annual Meeting,* Philadelphia, PA.
48. Charles, J.P. and **J.A. Nichols** (2019) "It's All in the Wrist - An Agar Phantom Experiment to Inform Study of Geometric Wrist Moment Arms." Poster at *Biomedical Engineering Society (BMES) Annual Meeting,* Philadelphia, PA.
49. Lopez, N., F. Pozzi and **J.A. Nichols** (2019) "Comparing Glenohumeral Joint Kinematics Using Motion Capture and Two OpenSim Shoulder Models." Poster at *Biomedical Engineering Society (BMES) Annual Meeting,* Philadelphia, PA.
50. Hao, K.A. and **J.A. Nichols** (2019) "Simulating Finger-Tip Force Using Two Common Contact Models: Hunt-Crossley and Elastic Foundation." Poster at *International Society of Biomechanics (ISB) and American Society of Biomechanics (ASB) Joint Meeting,* Calgary, Canada. ***Finalist ASB Undergraduate Award***
51. Lenz, A.L, **J.A. Nichols**, K.E. Roach, A. Barg, C.L. Saltzman, K.B. Foreman, and A.E. Anderson (2019) "In Vivo Subtalar Kinematics Following Tibiotalar Arthrodesis During Stair Tasks and Walking: A Dual-Fluoroscopy Study." Podium at *Gait & Clinical Movement Analysis Society Annual Meeting,* Dallas, TX.
52. Dansereau, O., M. Rionda, and **J.A. Nichols**. (2018) "Comparison of Tibiotalar and Subtalar Joint Moments Across Models of Healthy and Pathological Ankles." Undergraduate Poster at *Biomedical Engineering Society (BMES) Annual Meeting,* Atlanta, GA
53. Rionda, M., O. Dansereau, and **J.A. Nichols**. (2018) "Examining Tibiotalar and Subtalar Kinematics through Simulations of Healthy and Pathological Ankles." Undergraduate Poster at *Biomedical Engineering Society (BMES) Annual Meeting,* Atlanta, GA

54. **Nichols, J.A.**, K.S. Alguri, and J.B. Harley. (2018) "Identifying Biomechanical Wrist Impairments with Machine Learning: A Feasibility Study." Podium at *American Society of Biomechanics Annual Meeting,* Rochester, MN. ***Awarded ASB Young Scientist Post-Doctoral Award***

55. Lenz, A.L., K.E. Roach, **J.A. Nichols**, A. Barg, C.L. Saltzman, K.B. Foreman, and A.E. Anderson. (2018) "Subtalar Kinematics After Tibiotalar Fusion." Thematic poster at *American Society of Biomechanics Annual Meeting,* Rochester, MN.

56. **Nichols, J.A.**, K.B. Foreman, A. Barg, C.L. Saltzman, and A.E. Anderson. (2018) "Ankle Strength and Muscle Cross-Sectional Area in Patients with Successfully Fused Tibiotalar Joints Compared with Asymptomatic Contralateral Control Limbs." Poster at *Orthopaedic Research Society Annual Meeting,* New Orleans, LA.

57. **Nichols, J.A.** and A.E. Anderson. (2017) "Deficits in Mobility and Strength After Tibiotalar Arthrodesis." ePoster at *Gait & Clinical Movement Analysis Society Annual Meeting,* Salt Lake City, UT.

58. **Nichols, J.A.**, K.E. Roach, N.M. Fiorentino, and A.E. Anderson. (2016) "Subject-Specific Models to Predict Ankle Kinematics with Dual-Fluoroscopy as a Reference Standard." Podium at *Biomedical Engineering Society (BMES) Annual Meeting,* Minneapolis, MN.

59. **Nichols, J.A.**, K.E. Roach, N.M. Fiorentino, and A.E. Anderson. (2016) "Subject-Specific Ankle Models: Can They Predict Tibiotalar and Subtalar Joint Angles Measured *In Vivo* Using Dual-Fluoroscopy?" Thematic poster at *American Society of Biomechanics Annual Meeting,* Raleigh, NC.

60. **Nichols, J.A.**, K.E. Roach, and A.E. Anderson. (2016) "Assessing the Predictive Accuracy of Kinematic Hindfoot Models with Dual-Fluoroscopy as a Reference." Podium at *FOOT International Congress* hosted in part by *International Foot and Ankle Biomechanics (i-FAB) Community,* Berlin, Germany. http://dx.doi.org/10.1016/j.fas.2016.05.095.

61. **Nichols, J.A.**, M.S. Bednar, S.J. Wohlman, and W.M. Murray. (2015) "A Simulation Study of the Wrist and Thumb: Why Do Wrist Surgeries Decrease Lateral Pinch Strength?" Podium at *American Society of Biomechanics Annual Meeting,* Columbus, OH.

62. **Nichols, J.A.,** K.E. Roach, C.L. Saltzman, and A.E. Anderson. (2015) "Designing Biomechanical Models of the Ankle: How Many Degrees of Freedom are Necessary to Reflect In Vivo Joint Kinematics?" Podium at *Summer Biomechanics, Bioengineering, and Biotransport Conference,* Snowbird, UT.

63. **Nichols, J.A.** (2015) "Empowering Researchers to Shape Medical Innovation." Podium at *8th International Conference on Ethics in Biology, Engineering, and Medicine,* Brooklyn, NY. (**published in a special issue of the *International Journal of Medical Implants and Devices*, 7(1):3**).

64. **Nichols, J.A.**, M.S. Bednar, R.M. Havey, and W.M. Murray. (2014) "Understanding the Kinematic Design of the Wrist: A Cadaveric Study Examining the Relationship Between the Scaphoid, the Midcarpal Joint, and Wrist Axes of Rotation." Poster at *World Congress of Biomechanics,* Boston, MA.

65. **Nichols, J.A.**, M.S. Bednar, R.M. Havey, and W.M. Murray. (2013) "Proximal Row Carpectomy and Scaphoid-Excision Four-Corner Fusion Impact the Mechanical Actions of Writ and Hand Muscles." Poster at *68th Annual Meeting of the American Society for Surgery of the Hand,* San Francisco, CA.
66. **Nichols, J.A.**, M.S. Bednar, R.M. Havey, and W.M. Murray. (2013) "Connecting the Wrist to the Hand: How Does the Design of the Wrist Influence Moment Arms of Wrist and Hand Muscles?" Poster at *24th Congress of the International Society of Biomechanics*, Natal, Brazil. ***Finalist for David Winter Young Investigator Award***
67. **Nichols, J.A.**, M.S. Bednar, R.M. Havey, and W.M. Murray. (2013) "Surgical Simulations Based on Limited Quantitative Data: What Can We Learn?" Podium at *11th International Symposium: Computer Methods in Biomechanics and Biomedical Engineering*, Salt Lake City, UT.
68. **Nichols, J.A.**, R.M. Havey, M.S Bednar, and W.M. Murray. (2012) "Kinematic Implications of Altering the Design of the Wrist: A Cadaveric Study Examining Midcarpal Fusion and Scaphoid Excision." Podium at *2012 Summer Bioengineering Conference,* Fajardo, Puerto Rico. http://dx.doi.org/10.1115/SBC2012-80125
69. **Nichols, J.A.**, M.S. Bednar, A.K. Balaram, R.M. Havey, and W.M. Murray. (2011) "Wrist Kinematics Following Scaphoid-Excision Four Corner Fusion." Poster at *American Society of Biomechanics Annual Meeting,* Long Beach, CA.
70. **Nichols, J.A.**, M.S. Bednar, W.M. Murray. (2010) "Surgical Simulations of Proximal Row Carpectomy and Scaphoid-Excision, Four-Corner Fusion." Podium at *65th Annual Meeting of the American Society for Surgery of Hand,* Boston, MA. http://dx.doi.org/10.1016/S0363-5023(10)60088-3
71. **Nichols, J.A.**, M.S. Bednar, W.M. Murray. (2010) "Development of a Biomechanical Model of the Wrist Following Proximal Row Carpectomy." Podium at *7th Triennial International Hand and Wrist Biomechanics Symposium,* Cleveland, OH.
72.

INVITED RESEARCH TALKS

National and International

1. **Nichols, J.A.** (2023) "Transfer Learning & Explainable AI: Applications to Orthopaedic Biomechanics" Hosted by Dr. Cheryl Liu, Senior Principal Engineer, *Modeling & Simulation Division, Stryker*. Virtual Format.
2. **Nichols, J.A.** (2023) "Transfer Learning & Explainable AI: Lessons from Computational and Experimental Work in the Upper Limb" presented in the "Practical Considerations for Applying and Interpreting AI/ML Models in Orthopaedics" Session. Hosted by the *Implant Section* at *Orthopaedic Research Society (ORS) Annual Meeting*. Dallas, TX.
3. **Nichols, J.A.** (2022) "Building Predictive Simulations through the Integration of Machine Learning & Musculoskeletal Models" presented at "Assistive Robotics Workshop @HRI-EU". Hosted by *Honda Research Institute Europe (HRI-EU).* Virtual Format.

4. **Nichols, J.A.** (2021) “Integrating Machine Learning, Musculoskeletal Simulations, & Orthopaedic Biomechanics” Talk presented at "Robotics in clinical application: Thinking outside the box" Session. Hosted by *Biomedical Engineering Group Twente.* Virtual Format.
5. **Nichols, J.A.** (2021) “Building Predictive Simulations through the Integration of Machine Learning & Musculoskeletal Models” *University Twente.* Virtual Format.
6. **Nichols, J.A.** (2021) “Enhancing Utility of Musculoskeletal Simulations through Machine Learning Technique” Invited Talk for the “Applications of Machine Learning from Diagnostics to Prognostics" Workshop at *Orthopaedic Research Society Annual Meeting*. Virtual Format.
7. **Nichols, J.A.** (2017) “In Vivo Arthrokinematics of the Healthy, Diseased, and Post-Operative Ankle” *AOFAS Traveling Fellows visit to University of Utah*. Salt Lake City, UT.
8. **Nichols, J.A.** (2015) “Probing the Predictive Limits of Biomechanical Models” *Department of Mechanical Engineering, Brigham Young University*. Provo, UT.
9. **Nichols, J.A.** (2014) “Using Surgical Simulation to Understand the Design of the Musculoskeletal System” *Department of Mechanical Engineering, University of Utah.* Salt Lake City, UT.

Local – Department, University, Institute

1. **Nichols, J.A.** (2021) “Integrating Machine Learning & Musculoskeletal Models to Inform Patient-Specific Clinical Care” *University of Florida – Exactech Symposium on Active Intelligence (AI) in Orthopaedics*. Gainesville, FL.
2. **Nichols, J.A.** (2021) “Ep. 7 – Jennifer A. Nichols, Ph.D.” *Price of Pain Podcast*. Available at https://price.ctsi.ufl.edu/price-of-pain-podcast/
3. **Nichols, J.A.** (2021) “Bridging the Gap Between Musculoskeletal Pain and Human Movement Biomechanics” *Pain Research Intervention Center of Excellence (PRICE) Data Blitz*. Gainesville, FL.
4. **Nichols, J.A.** (2021) “Musculoskeletal Biomechanics” *University of Florida Orthopaedic Student Interest Group*. Virtual Format.
5. **Nichols, J.A.** (2020) “Leveraging Predictive Biomechanical Simulations of Understand the Musculoskeletal System” *Rheumatology Grand Rounds*, University of Florida, Virtual Format.
6. **Nichols, J.A.** (2019) “Predictive Biomechanical Simulations of the Musculoskeletal System” *Interdisciplinary Microsystems Group (IMG)*, University of Florida, Gainesville, FL.
7. **Nichols, J.A.** (2019) “Predictive Biomechanical Simulations: Applications to the Human Musculoskeletal System” *Whitney Lab*, Univ. of Florida, St. Augustine, FL.

INVITED PROFESSIONAL DEVELOPMENT TALKS & PANELS

National and International

1. **Nichols, J.A.** (2023) "The view from a beginning assistant professor" Invited Panelist in "Writing a Successful NIH R01 Proposal" Workshop at *American Society of Biomechanics Annual Meeting*, Knoxville, TN.
2. **Nichols, J.A.** (2023) "Navigating Interviews and Negotiations" Invited Panelist by the *Postdoc Affinity Group, American Society of Biomechanics*. Virtual Format.
3. **Nichols, J.A.** (2023) "Starting Your Small Business aka Your Lab!" Invited Panelist by the *Postdoc Affinity Group, American Society of Biomechanics*. Virtual Format.
4. **Nichols, J.A.** (2020) "Responding to COVID-19 Equipment Needs" Invited Speaker at the *American Institute for Medical and Biological Engineering (AIMBE) Academic Council Meeting*. Virtual Format.
5. **Nichols, J.A.** (2017) "I Wish I Had Known… How to Find the Right Postdoctoral Position," Professional Development Panel, The National Diversity in STEM Conference, *Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)*, Salt Lake City, Utah.
6. **Nichols, J.A.** (2017) "LEVERAGE Engineering Faculty Career Panel," Professional Development Panel Sponsored by a National Science Foundation (NSF) INCLUDES grant (EEC #1649384), The National Diversity in STEM Conference, *Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)*, Salt Lake City, Utah.

Local – Department, University, Institute

7. **Nichols, J.A.** (2021) "Scientific Writing," *Professional Development Panel, University of Florida American Society of Biomechanics (UF ASB) Student Chapter*, Virtual Format.
8. **Nichols, J.A.** (2020) "Scientific Writing," Invited Faculty Speaker, *University of Florida Biomedical Engineering Society (BMES) Student Chapter*, Gainesville, FL.
9. **Nichols, J.A.** (2019) "Vision Talks," *Professional Development Panel, Pruitt Research Day, J. Crayton Pruitt Department of Biomedical Engineering*, Gainesville, FL.
10. **Nichols, J.A.** (2019) "Career Strategies & Tomorrow's Professor," *Lunch Discussion, Postdoctoral Book Club led by Dr. Chelsea Simmons*, Gainesville, FL.
11. **Nichols, J.A.** (2019) "Academic Job Market," *Professional Development Panel, Pruitt Research Day, J. Crayton Pruitt Department of Biomedical Engineering*, Gainesville, FL.
12. **Nichols, J.A.** (2019) "Women's History Month Panel," *Professional Development Panel, J. Crayton Pruitt Department of Biomedical Engineering*, Gainesville, FL.
13. **Nichols, J.A.** (2017) "Academic Careers & the Academic Job Market," *Lunch & Learn Series Panel, Utah Postdoctoral Association*, University of Utah, Salt Lake City, UT.

MENTORSHIP

Summary of Mentoring Record at University of Florida

	Student Type	*Number*	*Diversity*
Primary Mentor	Ph.D.	6	5 female, 3 URM
	M.S.	6	3 female, 2 URM
	Medical Student	4	1 URM
	Undergraduate	35	21 female, 7 URM
	Post-Bacc	1	1 female, 1 URM
	Total	**52**	**58% female, 25% URM**
Committee Member	Ph.D.	14	8 female, 2 URM
	M.S.	1	
	Undergraduate	12	6 female, 1 URM
	Total	**27**	**52% female, 11% URM**

Primary Advisor

Ph.D. Graduate Research Assistants

- Alexis Benoit, Dept. Biomedical Engineering — Aug. 2022 – present
- Chloe Baratta, Dept. Biomedical Engineering — Aug. 2020 – present
- Maximillian Diaz, Dept. Biomedical Engineering — Aug. 2020 – present
  National Science Foundation Fellowship (NSF GRFP)
- Sarah Barron, Dept. Biomedical Engineering — Aug. 2019 – present*
- Kalyn Kearney, Dept. Biomedical Engineering — Aug. 2018 – present*
  National Science Foundation Fellowship (NSF GRFP)
- Tamara Ordonez Diaz, Dept. Biomedical Engineering — Aug. 2018 – present*
  National Institutes of Health Fellowship (NRSA F31 from NIA)

**expected graduation December 2023*

M.S. Research Assistants

- Shantanu Amin, Dept. Applied Physiology & Kinesiology — Aug. 2022 – May 2022
- Lillian Pennick, Dept. Biomedical Engineering — Jan. 2022 – Dec. 2022
- Zachary Graves, Dept. Biomedical Engineering — Aug. 2021 – May 2022
- Yasniary Morales, Dept. Biomedical Engineering — Jan. 2020 – May 2021
- Paola Diaz Portela, Dept. Biomedical Engineering — Aug. 2018 – May 2020
- Shuo Chen, Dept. Applied Physiology & Kinesiology — Aug. 2018 – May 2019

Undergraduate Research Assistants

***Completed Senior Honors Thesis*

- Matthew Erk, Dept. Biomedical Engineering — Sept. 2022 – present
- Yasmine Elkaldi, Dept. Biomedical Engineering — Sept. 2022 – present
- Katelyn Fry, Dept. Biomedical Engineering — Sept. 2022 – present
- Emma Patterson, Dept. Mechanical Engineering — Sept. 2022 – May 2022
- Mariangel Benejam, Dept. Biomedical Engineering — May 2022 – present
- Naomi Fils, Dept. Biomedical Engineering — May 2022 – Dec. 2022

- Jenielle Urquia, Dept. Biomedical Engineering May 2022 – present
  2022 BME Research Summer Experience Awardee
- Alec McGregor, Dept. Biomedical Engineering Jan. 2022 – present
- Pavitpaul Makkar, Dept. Biomedical Engineering Jan. 2022 – present
- Alisa Rendina, Dept. Biomedical Engineering Jan. 2022 – present
  2021-2022 University Research Scholars Program
- Megan Yip, Dept. Biomedical Engineering Sept. 2021 – May 2022
- Cassidy Sheldon, Dept. Applied Physiology & Kinesiology Aug. 2021 – May 2022
- *Fernanda Campos, Dept. Biomedical Engineering Aug. 2021 – May 2022
- *Lavanya Durai, Dept. Biology & Dept. Political Science Feb. 2021 – May 2022
- *Samuel Licht, Dept. Biomedical Engineering Jan. 2021 – May 2022
- Karley Baringer, Dept. Biomedical Engineering Jan. 2021 – present
- *Kristin Thorne, Dept. Biomedical Engineering Jan. 2020 – May 2022
- Corrine Meyers, Dept. Electrical & Computer Engineering Jan. 2020 – Dec. 2020
- Gabriel Brosula, Dept. Computer Science Jan. 2020 – May 2020
  2019-2020 University Research Scholars Program
- *Nicholas Jackson, Dept. Computer Science Oct. 2019 – May 2022
- *Taylor Hilton, Dept. Biological Engineering Aug. 2019 – May 2022
  2020-2021 University Scholars Program Awardee
- *Dominique Barnes, Dept. Mechanical Engineering Aug. 2019 – Dec. 2020
- *Guo Quian, Dept. Biomedical Engineering Jan. 2019 – May 2020
  2019-2020 University Scholars Program Awardee
- *Jonathan Charles, Dept. Biomedical Engineering Jan. 2019 – May 2020
  2019-2020 University Scholars Program Awardee
- *Kendall Moran, Dept. Biomedical Engineering Sept. 2018 – May 2022
  2020-2021 University Scholars Program Awardee
- *Taylor Rakauskas, Dept. Nutritional Sciences Sept. 2018 – Dec. 2021
  2020-2021 University Scholars Program Awardee
- *Yasmina Bassi, Dept. Biomedical Engineering Aug. 2018 – May 2021
- *Olivia Dansereau, Dept. Biomedical Engineering May 2018 – May 2019
- *Koen Flores, Dept. Biomedical Engineering Jan. 2018 – May 2021
  2020-2021 University Scholars Program Awardee
- *Kevin Hao, Medical Honors Program Jan. 2018 – July 2020
  2018-2019 University Scholars Program Awardee
- *Nicolas Lopez, Dept. Biomedical Engineering Jan. 2018 – May 2020
- *Micaela Rionda, Dept. Material Science & Engineering Jan. 2018 – May 2019
- *J. Stephen Blackman, Dept. Biomedical Engineering Jan. 2018 – May 2018

Visiting Students

- Amaya Lewis, Visiting Scholar May 2021 – Aug. 2021
- Kelly Nair Rojas, McNair Scholar June 2018 – Aug. 2018

Medical Student Research Program (*co-advised with C.W. Reb, DO*)

- Kevin Root, College of Medicine June 2022 – present
- Kevin Hao, College of Medicine Aug. 2020 – present
  2023 University of Florida Hall of Fame Inductee
- Andrew Blake, College of Medicine June 2021 – Aug. 2021
- Jose Zermeno, College of Medicine June 2020 – Aug. 2020

Thesis Committee Member

Dissertation Research (Ph.D.)

- Katrina Cernucan, Biomedical Engineering, University of Utah present
- Muhammad Alma, Electrical & Computer Engineering, Univ. of Florida present
- Jacob Salminen, Biomedical Engineering, University of Florida present
- Erica Lindbeck, Electrical & Computer Engineering, University of Florida present
- Andrew Jensen, Mechanical & Aerospace Engineering, Univ. of Florida present
- W. Sebastian Barrutia, Biomedical Engineering, University of Florida present
- Jacob Griffith, Biomedical Engineering, University of Florida present
- Noelle Jacobsen, Biomedical Engineering, University of Florida present
- Jenna Link, Nutrition & Integrative Physiology, University of Utah present
- Markia Bowe, Biomedical Engineering, University of Florida Aug. 2023
- Rachel Hybart, Biomedical Engineering, University of Florida Aug. 2023
- Lindsay Palm, Mechanical & Aerospace Eng., University of Florida May 2022
- Mhairi MacLean, Biomedical Engineering, University of Florida Aug. 2020
- Bryan Schlink, Biomedical Engineering, University of Florida Aug. 2020

Undergraduate Thesis (B.S.)

- Lhotse Thompson, Mechanics & Aerospace Eng., University of Florida Dec. 2022
- Tiffany Gandhikumar, Biomedical Engineering, University of Florida May 2022
- Natalie Thurlow, Biomedical Engineering, University of Florida May 2022
- Sireen Hilo, Biomedical Engineering, University of Florida May 2022
- Nicolas Grimaldi, Biomedical Engineering, University of Florida May 2022
- Jacklyn Griffis, Mechanics & Aerospace Eng., University of Florida May 2022
- Brooke Towns, Mechanical & Aerospace Eng., University of Florida May 2021
- Conor Lysek, Mechanical & Aerospace Eng., University of Florida May 2021
- Hunter Ramsay, Biomedical Engineering, University of Florida May 2020
- J. Stephen Blackman, Biomedical Engineering, University of Florida May 2020
- Brian Blair, Biomedical Engineering, University of Florida May 2019
- John M. Beitter, Biomedical Engineering, University of Florida May 2018

SERVICE & LEADERSHIP

University of Florida

Founding Faculty Advisor, Am. Soc. Biomechanics Student Chpt.	Jan. 2020 – present
Mentor, University Multicultural Mentor Program (UMMP)	2018 – 2021
Grant Reviewer, UF Center for Advancing Minority Pain & Aging Science	March 2021
Judge, Annual Neuromuscular Plasticity Symposium	March 2018

Herbert Wertheim College of Engineering (HWCOE), University of Florida

Member, Mentoring Task Force	2021
Judge, Integrated Product & Process Design (IPPD) Prototype Day	March 2021
Liaison, UF Open-Source Ventilator Project	March 2020 – May 2020
Member, HWCOE COVID-19 Response Efforts	March 2020 – May 2020
Member, Work-Life Balance Committee	2019
Graduation Marshall	2017, 2019, 2023

Department of Biomedical Engineering, University of Florida

Member, Undergraduate Program Committee	Aug. 2021 – present
Member, Engagement, Outreach, & Public Relations Committee	Aug. 2021 – present
Moderator, Industry Insider Webinar	Oct. 2021
Member, Executive Committee	Aug. 2020 – Aug. 2021
Faculty Advisor, Graduate Student Council	Sept. 2018 – Aug. 2020
Member, Graduate Program Committee	Aug. 2018 – Aug. 2021
Member, Faculty Search Committee	May 2018 – Aug. 2021
Poster Judge, Pruitt Research Day	2018, 2019, 2023

Biomedical Engineering Society (BMES)

Member, Ethics Subcommittee	2021 – 2023
Session Chair, Rehabilitation Engineering Session at Annual Meeting	October 2019

Orthopaedic Research Society (ORS)

Moderator, From Biology to Mechanics in Hand and Wrist Session	February 2020
Moderator, Foot & Ankle Session at Annual Meeting	March 2018

Hand & Wrist Biomechanics International (HWBI)

Moderator, HWBI Session at International Society of Biomechanics	July 2021

International Society of Biomechanics Technical Group on Computer Simulation (ISB TGCS)

Member, Executive Board	July 2022 – present
Scientific Co-Chair, 19th International Symposium on Computer Simulation	July 2023
Moderator, Implants, Orthotics, Prosthetics, and Devices Session	July 2021

American Society of Biomechanics (ASB)

Early Career Faculty Affinity Group	
Founder & Chair	Aug. 2019 – Aug. 2023
Session Chair, Annual Meeting Workshop	2020, 2021
Mentor, Student-Faculty Mentoring Program	2018 – present
Reviewer, Awards Committee	2019, 2021
Invited Speaker, Student Career Roundtables	2017, 2021
Invited Judge, Clinical Biomechanics & Journal of Biomechanics Award	Aug. 2021
Moderator, Upper Extremity Thematic Poster Session at Annual Meeting	Aug. 2021

Moderator, Computational Modeling Podium Session at Annual Meeting Aug. 2020
Invited Judge, Undergraduate Research Competition Aug. 2018
Moderator, Foot & Ankle Thematic Poster Session at Annual Meeting Aug. 2016
Moderator, Upper Extremity Podium Session at Annual Meeting Aug. 2015

University of Utah
Postdoctoral Policies Committee, University of Utah Jan. 2016 – Nov. 2017
Utah Postdoctoral Association (UPDA), University of Utah
Senior Chair June 2015 – June 2016
Junior Chair Jan. 2015 – June 2015
Board Member Oct. 2014 – Nov. 2017

OUTREACH

National Biomechanics Day, American Society of Biomechanics April 2018 – present
Description: Leading University of Florida's outreach activities for this national celebration of biomechanics. Annually, approximately 50-70 middle school students visit UF to engage in biomechanics-activities designed by over 10 labs across 3 colleges. As of 2020, this event is organized by the University of Florida's American Society of Biomechanics Student Chapter, for which I serve as the founding faculty advisor.

Faculty Speaker, Multidisciplinary Research Experience for Teachers July 2022
Description: Conduct lab tour for K-5 teachers completing a multi-week summer program on incorporating advanced STEM concepts into elementary school classrooms.

ShadowSHPE, UF Society of Hispanic Professional Engineers (SHPE) Jan. 2022
Description: Conduct lab tour for high school students visiting University of Florida campus to understand undergraduate research opportunities.

Science Expert, Howard Bishop Middle School Sept. 2019 – May 2020
Description: Serve as a scientific expert and pen pal to a group of four 7th grade girls completing a year-long engineering design project.

Invited Speaker, Girls with Nerve Summer Camp July 2019, July 2022
Description: Led three hands-on activities on musculoskeletal biomechanics. Annually, approximately 25 middle school girls participate in a 1-week, NSF-funded summer camp led by Dr. Daniel Ferris and Dr. Rachel Seidler.

Volunteer Mentor, Ladies Learning to Lead May 2018
Description: Participated in an eSTEAM Mentor lunch during which professionals in the fields of entrepreneurship, science, technology, engineering, art, and mathematics spoke with high school students about their career journeys.

Volunteer, Perry Initiative March 2018
Description: Led hands-on demonstrations for high school students at the Orthopaedic Research Society (ORS) Annual Meeting to inspire females to pursue careers in orthopaedic surgery and engineering.

Mentor, Park City High School Capstone Project Jan. 2016 – June 2016
Description: Acted as a client and mentor for an engineering capstone project at a local Salt Lake City high school. Met monthly with student team and facilitated student-led design of a MRI-compatible traction device for imaging ankle cartilage.

Volunteer, 2nd Annual Girls Engineering Night May 2016
Description: Mentored middle school girls during a series of hands-on workshops, such as designing catapults, building electro-magnetic motors, and making liquid nitrogen ice cream. This event was hosted at The Leonardo Museum by the Society of Women Engineer's (SWE) Greater Salt Lake Section.

Founder, Contemporary Controversies in Research Ethics June 2013 – Aug. 2014
Description: Bi-monthly discussion group at Northwestern University that is designed to augment traditional Responsible Conduct of Research training through interdisciplinary discussions of research ethics.

Mentor, Science Club Sept. 2011 – Sept. 2013
Description: Weekly, after school program in Chicago. Mentors lead small groups of at-risk middle school students through 10-week curricular units that promote science engagement. Mentors also received regular training on best practices for establishing and leading outreach activities. Further details at https://scienceclub.northwestern.edu
Funding: National Institutes of Health Science Education Partnership Award (SEPA)

REVIEWER

Grants
Department of Veteran Affairs (2019)
National Science Foundation (2018, 2019, 2020, 2021)
National Institutes of Health (2019)
Orthopaedic Research & Education Foundation (2022)
Orthopaedic Research Society (2016)

Journals
Annals of Biomedical Engineering
Biomedical Engineering Online
Clinical Biomechanics
Computer Methods in Biomechanics and Biomedical Engineering
Foot and Ankle International
Journal of Applied Biomechanics
Journal of Biomechanical Engineering
Journal of Biomechanics
Journal of NeuroEngineering and Rehabilitation
Journal of Orthopaedic Research
Medical Engineering & Physics
Medicine & Science in Sports & Exercise
Osteoarthritis & Cartilage
Part H: Journal of Engineering Medicine
PeerJ
Scientific Reports
Transactions on Neural Systems & Rehabilitation Engineering

Conference Abstracts
American Society of Biomechanics
Biomedical Engineering Society
IEEE Engineering in Medicine & Biology Society
Orthopaedic Research Society
Technical Group on Computer Simulation

PROFESSIONAL AFFILIATIONS	**American Society of Biomechanics**, Member (since 2010) **American Society of Mechanical Engineers**, Member (since 2006) **Biomedical Engineering Society,** Member (since 2007) **Gait & Clinical Movement Analysis Society,** Member (since 2017) **Hand and Wrist Biomechanics International**, Member (since 2019) **International Foot and Ankle Biomechanics Community**, Member (since 2016) **International Society of Biomechanics**, Member (since 2010) **Orthopaedic Research Society**, Member (since 2015) **Society of Women Engineering**, Member (since 2005) **Technical Group on Computer Simulation**, Member (since 2013)