Exponent®
Engineering & Scientific Consulting

Kristen Renner, Ph.D.

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Professional Profile

Dr. Renner has specialized in injury, orthopedic and sports biomechanics with extensive experience with human performance assessments, IMUs, and consumer grade activity monitoring devices. Her work includes biomechanical reconstruction and analysis of injuries related to motor vehicle, premises, workplace, and recreational accidents.

Dr. Renner has experience using a wide variety of methods including anthropomorphic test devices, motion capture, modeling, inertial measurement units (IMUs), electromyography (EMG), pressure insoles, dynamometry, wearable devices, metabolic testing, and comprehensive systematic and scoping reviews. Dr. Renner has experience with linear and nonlinear analysis of human motion and has applied nonlinear analysis techniques in several projects. Dr. Renner has implemented translation of lab-based research practices to real-world data collection and analysis. Dr. Renner has published her work in the peer-reviewed scientific literature and has presented at national and international conferences on these topics.

Prior to joining Exponent, Dr. Renner was a faculty member at the University of Arizona College of Medicine in the Department of Orthopaedic Surgery. While at the University of Arizona, Dr. Renner established a research group and served as the Director of Biomechanics at Banner's High Performance Center, working directly with athletes representing a range of skill levels – from recreational to professional. Dr. Renner conducted several investigator-initiated research projects and built successful collaborations throughout the United States and Canada. Before joining the University of Arizona, Dr. Renner worked as a biomechanist for Hartford Healthcare's Bone and Joint Institute – an outpatient physical therapy and orthopaedic center. While at the Bone and Joint Institute, Dr. Renner provided biomechanical assessments and insights for high performing athletes and orthopaedic patients.

Academic Credentials & Professional Honors

Ph.D., Biomedical Engineering, Virginia Polytechnic Institute and State Univ, 2019

B.S., Biomedical Engineering, Virginia Commonwealth University (VCU), 2015

2023 Women to Watch in Medicine and Science, University of Arizona

2022 Nominated as Outstanding Undergraduate Biology Research Program Faculty Mentor, University of Arizona

2020 Hartford Healthcare Rehabilitation Network's Rookie of the year

Academic Appointments

Research Assistant Professor, Department of Orthopaedic Surgery, University of Arizona, 2021-2024

Affiliate Faculty, Department of Biomedical Engineering, University of Arizona, 2021-2024

Adjunct Professor, Department of Biomedical Engineering, Widener University, 2020

Prior Experience

Director of Biomechanics, Banner High Performance Center, 2023-2024

Research Assistant Professor, Department of Orthopaedic Surgery, University of Arizona, 2021-2024

Adjunct Professor, Department of Biomedical Engineering, Widener University, 2020

Clinical Biomechanist, Bone and Joint Institute, Hartford Healthcare 2019-2021

Professional Affiliations

ASTM International – Committee F1637, 2024-current

American Society of Biomechanics, 2016-current

American College of Sports Medicine, 2016-current

Biomedical Engineering Society, 2016-2021

Publications

Renner, K., Delaney, Co, Hill, C., Sands, L., Queen, R.M. (2022). Predicting Post-Operative Walking Speed Based on Pre-Operative Gait Mechanics. Journal of Orthopedic Research. Doi:10.1002/jor.25444.

Renner, K. E., Peebles, A. T., Socha, J. J., & Queen, R. M. (2022). The Impact of Sampling Frequency on Ground Reaction Force Variables. Journal of Biomechanics, 135:111034.

Renner, K., Queen, R. (2021). Change in Force-based Metrics during Outdoor Two-and Four-Mile Runs. Medicine and Science in Sports and Exercise, 53(9):1922-1927.

Renner, K., Queen, R. (2021). Detection of Age and Gender Differences in Walking Using Mobile Wearable Sensors. Gait & Posture, 87:59-64.

Peebles, A., Dickerson, L., Renner, K., Queen, R. Sex-Based Differences in Landing Mechanics Vary between the Drop Vertical Jump and Stop-Jump. (2020). J Biomech., 105:109818.

Renner, K. Williams, DS. Queen, R. The Reliability and Validity of the Loadsol® under Various Walking and Running Conditions. (2019). Sensors, 19(2):265.

Peebles, A. Renner, K. Miller, TK. Moskal, J. Queen, R. Associations between Distance and Loading Symmetry during Return to Sport Hop Testing. (2018). Med Sci Sports Exerc,, 51(4):624-629.

Peebles, A. Renner, K. Maguire, L. Queen, R. Validity and Repeatability of the Single Sensor loadsol During Landing. (2018). Sensors. 18(12):4082.

Renner, K. E., Franck, C. T., Miller, T. K., & Queen, R. M. Limb Asymmetry During Recovery from

Anterior Cruciate Ligament Reconstruction. (2018). J Orthop Res. 36(7):1887-1893.

Sikes, K. J., Renner, K., Li, J., Grande-Allen, K. J., Connell, J. P., Cali, V., ... & Wang, V. M. Knockout of Hyaluronan Synthase 1, but not 3, Impairs Formation of the Retrocalcaneal Bursa. (2018). J Orthop Res. 36(10):2622-2632.

Presentations

Alexis Henderson, Kristen Renner. 2023. Kinematic Comparison of Clinical Assessments for Anterior Cruciate Ligament Rehabilitation. American College of Sports Medicine.

Kristen Renner, Surajinder Bharaj, Alexis Henderson. 2023. Correlations Between Functional Tests and Implications for Return-to-sport Testing. American College of Sports Medicine.

Alexis Henderson, Kristen Renner. 2023. Kinematic Comparison of Clinical Assessments for Anterior Cruciate Ligament Rehabilitation. Undergraduate Biology Research Symposium. University of Arizona. Tucson, AZ.

Kristen Renner, Caitlyn Delaney, Cherice Hill, Laura Sands, Robin Queen. 2022. Predicting Post-Operative Walking Speed Based on Pre-Operative Gait Mechanics. North American Congress on Biomechanics. Ontario, Canada.

Joey Stevenson, Stefanie Bourassa, Kristen Renner. 2021. The Correlation of Common Clinical Tests with Secondary ACL Injury Predictors. Biomedical Engineering Society Annual Meeting. Orlando, FL.

Kristen Renner, Stefanie Bourassa. 2021. Functional Testing Can Predict Injuries and Guide Rehabilitation: A Case Study. American Academy of Sports Physical Therapy Annual Meeting & Scientific Conference. Indianapolis, IN.

Elisabeth Sappenfield, Kristen Renner, Stefanie Bourassa. 2021. Preventive Exercises to Reduce Work-Related Musculoskeletal Disorders for Vaginal Surgeons. American Urogynecologic Society. Digital meeting due to Covid-19.

Kristen Renner, Alexander Peebles, Robin Queen. 2021. The Impact of Sampling Frequency on Kinetic Outcomes. American Society of Biomechanics. Digital Meeting due to Covid-19.

Kristen Renner, Stefanie Bourassa. 2020. Baseline Assessment High School Athlete: Normative Functional Movement Values. American College of Sports Medicine. Digital meeting due to Covid-19.

Robin Queen, Kristen Renner, Alexander Peebles. 2019. Landing Mechanics Differences between the Drop Vertical Jump and Stop Jump. American College of Sports Medicine. Orlando, FL.

Adam Heilmann, Lindsay Maguire, Kristen Renner, Alex Peebles, Robin Queen. 2019. Jumping Task and Sex Alter Lower Extremity Landing Mechanics. Orthopaedic Research Society. Austin, TX.

Lindsay Maguire, Kristen Renner, Alex Peebles, Robin Queen. 2019. The Impact of Activity Level on Loading Symmetry during Return to Sport Hop Testing in Healthy Participants. Orthopaedic Research Society. Austin, TX.

Robin Queen, Lindsay Maguire, Kristen Renner, Alex Peebles, T.K. Miller. 2019. Sex-Specific Differences in Loading Symmetry in ACL Return to Sport Testing. Orthopaedic Research Society. Austin, TX.

Robin Queen, Kristen Renner, Jiafeng Zhu, Laura Sands. 2018. Association of Walking Speed with Gait Mechanics Following Total Ankle Arthroplasty. Annual ASB Meeting, Rochester, MN.

Robin Queen, Kristen Renner, Shyam Ranganatham, Divya Srinivasan. 2018. Predicting Measures of

Physical Performance from Gait Mechanics in Patients with Ankle Osteoarthritis. Annual ASB Meeting, Rochester, MN.

Kristen Renner, Alex Peebles, Thomas Miller, Robin Queen. 2018. Correlation of Hop Distance and Loading Symmetry during Return to Sport Testing in Healthy Subjects. Annual ACSM Meeting, Minneapolis, MN.

Alex Peebles, Kristen Renner, Thomas Miller, Robin Queen. 2018. Hop Distance and Loading Symmetry in ACL Reconstructed Athletes During Return to Sport Testing. Annual ASB Meeting, Rochester, MN.

Alex Peebles, Kristen Renner, Robin Queen. 2018. The Loadsol is a Valid and Reliable Device for Evaluating Force During Landing". World Congress of Biomechanics, Dublin, Ireland.

Robin Queen, Alexander Peebles, Kristen Renner, Thomas Miller. 2018. Functional Knee Bracing Improves Loading Symmetry Following ACL Reconstruction. Annual ACSM Meeting, Minneapolis, MN

Kristen Renner, Alex Peebles, Thomas Miller, Robin Queen. 2018. Correlation of Hop Distance and Loading Symmetry during Return to Sport Testing in Healthy Subjects. VCOM Research Recognition Day. Blacksburg, VA.

Kristen Renner, Evan McConnell, Alex Black, Lewis Young, Robin Queen. 2017. Effect of Achilles Taping on Joint Contributions to Work and Power. BMES Annual Meeting, Phoenix, AZ.

Kristen Renner, Robin Queen. 2017. Changes in Limb Symmetry during a 2 Mile Outdoor Run. ASB Annual Meeting, Boulder, CO.

Kristen Renner, DS Blaise Williams, Robin Queen. 2017. Validation of Single Sensor Wireless In-shoe Pressure Insoles during Running. ACSM, Denver, CO.

Vincent M. Wang, Kristen Renner, Katie J. Trella, Jun Li, John D. Sandy, Ron J. Midura, Anna Plaas. 2017. Elucidating Quantitative Relationships Between Tendon Hyaluronan Content and Biomechanical Properties. ORS Annual Meeting, San Diego, CA.

Kristen Renner, Katie Trella, John Sandy, Ron Midura, Anna Plaas, Vincent Wang. 2016. Knockout of Hyaluronan Synthases Differentially Alters Viscoelastic Properties of Mouse Achilles and FDL Tendons. BMES Annual Meeting, Minneapolis, MN.

Peer Reviews

Arthritis Care & Research, April 2022 – current

BMC Musculoskeletal Disorders, December 2021 – current

Gait & Posture, August 2020 – current

Journal of Biomechanics, August 2020 – current

Peer J, March 2020 – current

Applied Sciences, November 2019 – current