Exponent®
Engineering & Scientific Consulting

Leigh Allin, Ph.D., P.E.

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Professional Profile

Dr. Allin's expertise is in the analysis of human movement and injury mechanics. Her work involves biomechanical reconstruction and analysis of a variety of incident modes including motor vehicles, pedestrians, occupational accidents, work site incidents, slips and trips, falls from heights, and recreational activities.

Dr. Allin has technical knowledge and experience conducting research and case-specific testing using anthropomorphic test devices (ATDs), motion capture, volunteer studies, force transducers, inertial measurement units (IMUs), and electromyography (EMG). Dr. Allin has published in peer-reviewed journals on automotive occupant kinematics and human kinematics during slipping and tripping and is a certified English XL Tribometrist.

Prior to joining Exponent, Dr. Allin's research focused on evaluating the kinematics of slipping and tripping events. As a Graduate Research Assistant in the Occupational Ergonomics & Biomechanics Laboratories at Virginia Tech, as well as the Motion Biomechanics Lab at Texas A&M University, her research investigated kinematic responses to slipping, risk factors contributing to falls, such as obesity and fatigue, and balance training interventions to reduce fall risk. Dr. Allin also has experience in sports performance and injury biomechanics, specifically relating to running and golf, having previously worked as a biomechanical analyst in the SPEED (Strength, Power, Endurance, Education, and Development) Clinic at the University of Virginia.

Academic Credentials & Professional Honors

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

M.S., Engineering Mechanics, Virginia Polytechnic Institute and State Univ, 2014

B.S., Mechanical Engineering, Virginia Polytechnic Institute and State Univ, 2013

Best Biomechanics Presentation, Virginia Tech Biomedical Engineering Research Symposium, 2019

Johns Hopkins NIOSH Pilot Research Training Award, 2017

Atlantic Coast Conference Weaver-James-Corrigan Postgraduate Scholarship Award, 2013

Pi Tau Sigma (National Mechanical Engineering Honor Society)

Licenses and Certifications

Professional Engineer Mechanical, Arizona, #78759

Certified English XL Tribometrist (CXLT)

Northwestern University Center for Public Safety, Traffic Crash Reconstruction for Engineers

Prior Experience

Biomechanical Analyst, The SPEED Clinic, University of Virginia, 2014-2015

Professional Affiliations

American Society of Biomechanics (ASB)

Society of Automotive Engineers (SAE)

Publications

Sharpe SS, Grijalva S, Allin L, Courtney A, Toney-Bolger M, Pokutta-Paskaleva A, Crosby CL, Carhart M. Evaluation of Occupant Kinematics and Kinetics during Moderate Severity Simulated Frontal Impacts with and without Frontal Airbag Deployment. SAE Technical Paper No. 2023-01-0559. 2023.

Miller B, Dibb A, Allin L, Carhart M, Krishnaswami R. Seat Belt Restraint Evidence Generated by Unrestrained Occupant Interaction in a Rollover. SAE International Journal of Advances and Current Practices in Mobility, 4(2022-01-0846):1642-50.

Aviles J, Wright DL, Allin LJ, Alexander NB, Madigan ML. Improvement in trunk kinematics after treadmill-based reactive balance training among older adults is strongly associated with trunk kinematics before training. Journal of biomechanics. 2020; 113:110112.

Allin LJ, Brolinson PG, Beach BM, Kim S, Nussbaum MA, Roberto KA, Madigan ML. Perturbation-based balance training targeting both slip-and trip-induced falls among older adults: a randomized controlled trial. BMC geriatrics. 2020; 20(1):1-3.

Allin LJ, Madigan ML. Effects of manual material handling workload on measures of fall risk. IISE transactions on occupational ergonomics and human factors. 2020; 8(3):155-65.

Allin LJ, Nussbaum MA, Madigan ML. Two novel slip training methods improve the likelihood of recovering balance after a laboratory-induced slip. Journal of Applied Biomechanics 2019; 35(1): 37-43. doi: https://doi.org/10.1123/jab.2018-0076.

Aviles J, Allin LJ, Alexander NB, Van Mullekom J, Nussbaum MA, Madigan ML. Comparison of treadmill trip-like training versus Tai Chi to improve reactive balance among independent older adult residents of senior housing: a pilot controlled trial. The Journals of Gerontology: Series A 2019; 74(9):1497-1503. doi: 10.1093/gerona/glz018.

Prokopy MP, Lee S, Perry JA, Allin LJ, Hyrvniak DJ, Weltman AL. Deliberate shot trajectories of highly-skilled golfers: associated changes and diversity in ground reaction forces. Translational Sports Medicine 2018; 1:160–165. doi: 10.1002/tsm2.30.

Madigan ML, Aviles, J, Allin LJ, Nussbaum MA, Alexander, NB. Reactive balance rating after a trip-like perturbation on a treadmill associates with fall risk among residents of older adult congregate housing. The Journals of Gerontology: Series A 2018; 78(9): 1222-1228. doi: 10.1093/gerona/gly077.

Allin LJ, Nussbaum MA, Madigan ML. Feet kinematics upon slipping discriminate between recoveries and three types of slip-induced falls. Ergonomics 2018; 61 (6):866-876. doi: 10.1080/00140139.2017.1413212.

Allin LJ, Wu X, Nussbaum MA, Madigan ML. Falls resulting from a laboratory-induced slip occur at a higher rate among adults who are obese. Journal of Biomechanics 2016; 49(5): 678-683. doi: 10.1016/j.jbiomech.2016.01.018.

Presentations

Allin LJ, Aviles J, Nussbaum MA, Alexander NB, Madigan ML. A Reactive Balance Rating Method to Assess Performance After Treadmill-Induced Trip-Like Perturbations. Poster presentation, 42nd Annual Meeting of the American Society of Biomechanics, Rochester, MN, August 8-11, 2018.

Allin LJ, Nussbaum MA, Madigan ML. Slip recovery training improves balance recovery ability following laboratory-induced slips. Podium presentation, University of Dayton Academic Research Colloquium, Dayton, OH, October 10-12, 2017.

Allin LJ, Nussbaum MA, Madigan ML. Two Cost-Effective Methods for Slip Training Improve Recovery Rate Following Laboratory-Induced Slips. Poster presentation, 41st Annual Meeting of the American Society of Biomechanics, Boulder, CO, August 8-11, 2017.

Allin LJ, Nussbaum MA, Madigan ML. A Cost-Effective Method for Repeated Slip Training Increases Recovery Rate Following Laboratory-Induced Slips. Podium presentation, American College of Sports Medicine Annual Meeting, Denver, CO, June 2017.

Allin LJ, Nussbaum MA, Madigan ML. Slip training improves recovery rate following laboratory-induced slips. Podium presentation, South Central Regional Meeting of the American Society of Biomechanics, Plano, TX, March 31 – April 1, 2017.

Allin LJ, Nussbaum MA, Madigan ML. Trailing limb response characteristics are associated with fall direction following laboratory-induced slips. Podium presentation, 40th Annual Meeting of the American Society of Biomechanics, Raleigh, NC, August 2016.

Allin LJ, Nussbaum MA, Madigan ML. Differences in trailing limb responses between falls and recoveries following laboratory-induced slips. Poster presentation, American College of Sports Medicine Annual Meeting, Boston, MA, July 2016.

Allin LJ, Wu X, Nussbaum MA, Madigan ML. Falls resulting from a laboratory-induced slip occur at a higher rate among young and older adults who are obese. Poster presentation, Annual Meeting of the American Society of Biomechanics, Columbus, OH, August 5-8, 2015.

Allin LJ, Wu X, Nussbaum MA, Madigan ML. Obesity Increases Fall Risk After Slipping Among Young Adults. Poster presentation, 7th World Congress of Biomechanics, Boston, MA, July 2014.

Allin LJ, Wu X, Nussbaum MA, Madigan ML. Effects of Obesity on Slips and Falls Among Young Adults. Poster presentation, Midwest Regional Meeting of the American Society of Biomechanics, Akron, OH, March 4-5, 2014.

Peer Reviews

Medicine & Science in Sport & Exercise

Journal of Applied Ergonomics

Neuroscience Letters

IIE Transactions on Occupational Ergonomics and Human Factors