

SHANNON LEIGH MATHIS

The University of Alabama in Huntsville

College of Education
Department of Kinesiology: Exercise Science
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Education and Training

05/1998 BS (Mathematics) Mississippi College, Clinton
12/1999 MS (Mathematics) Mississippi College, Clinton
05/2007 MS (Mathematics) University of Tennessee, Knoxville
12/2011 PhD (Health and Human Performance) Middle Tennessee State University,
Murfreesboro

Postdoctoral Training

2011-2013 Vanderbilt University Medical Center, Department of Orthopaedic Surgery and
Rehabilitation (Staff Scientist), Nashville, TN

Academic Appointments

2015-present Assistant Professor, Department of Kinesiology, The University of Alabama in
Huntsville (UAH)
2014-2015 Lecturer, Department of Mathematics, Belmont University, Nashville, TN
2013-2014 Lecturer, Department of Mathematics and Statistics, University of Tennessee at
Martin

Awards

- The 2019 Howard R. Thranhardt Lecture Series Award from the American Academy of
Orthotists & Prosthetists
- The 2018 University of Alabama in Huntsville Research and Creative Activity Mentor
Award

Grants

Present and Active

- “Gait Analysis Using Video: Defining K-Level in Lower-Limb Prosthesis Users,”
American Orthotic & Prosthetic Association’s Small Grant Pilot Program from Center for
Orthotic and Prosthetic Learning and Outcomes/Evidence-Based Practice. 6/2018 –
6/2020. Total costs: \$5,145. Role: PI.
- “Data-based Clinical Decision Making: Using Motion Capture and Video Analysis to
Define Mobility in Adults with Lower-limb Amputation,” UAH Individual Investigator
Distinguished Research Program (IIDR) from UAH Office of the Vice-President for

Research and Economic Development (OVPRED) 6/2018-6/2020. Total costs: \$44,000.
Role: PI.

Past Funding

- “From Aeronautics to Biomechanics: Enhancing and Broadening the Research Capabilities of the ATOM Lab,” UAH Research Infrastructure Fund from OVPRED. 3/2018-3/2019. Total costs: \$15,575. Role: Co-I.
- “Improving Outcomes in Lower-Limb Amputees: Reducing Fall Risk and Improving Mobility,” UAH New Faculty Research Program from OVPRED. 11/2017-4/2019. Total cost: \$10,000. Role: PI.
- “Feasibility of Underwater Treadmill Training to Improve Mobility and Disability in Unilateral, Transtibial Amputees,” Orthotic and Prosthetic Education and Research Foundation, Inc. Small Grant Program. 6/2017-6/2019. Total costs: \$25,000. Role: PI.
- “Dual-Energy X-Ray Absorptiometry (DXA): Investigation of Bone Health, Body Composition, and Cardiovascular Health,” UAH Research Infrastructure Fund from OVPRED. 3/2017-3/2018. Total costs: \$95,000. Role: PI.
- “Improving Outcomes in Amputees: Feasibility of Underwater Treadmill Training and Definition of Lower Limb Kinematics,” UAH Cross-College Faculty Research grant from OVPRED. 1/2017-1/2018. Total costs: \$5,000. Role: PI.
- “Materials Working Group,” UAH Cross-College Faculty Research grant from OVPRED. 1/2017-1/2018. Total costs: \$5,000. Role: Co-I.
- “Calcium loss in sweat: An unrecognized risk factor for bone fracture and osteoporosis.” \$5,000,” UAH Cross-College Faculty Research grant from OVPRED. 1/2017-1/2018. Total costs: \$5,000. Role: PI.

Membership in Professional Societies

2008-present Member, American College of Sports Medicine
2016-present Member, American Academy of Orthotics and Prosthetics,

Boards and Peer-Review Service

2018-present Chair, Alabama Pre-professional Academic Committee for Kinesiology and Exercise Science
2018-2020 Co-Chair, ACSM BONE Interest Group
2018-present Member, the University of North Alabama’s Advisory Committee for the Doctorate in Exercise Science
2018-present Co-Director, Exercise Science program, UAH
2016-2018 Coordinator, Department of Kinesiology, UAH
2018 Chair, ACSM-BONE Interest Group Awards Committee
2017 Social Media Liaison, ACSM-BONE interest Group

Manuscript Reviewer: Journal of Prosthetics and Orthotics
 International Journal of Sports Medicine
 British Journal of Medicine and Medical Research
 BAOJ Orthopedics

Bibliography

Peer-reviewed Publications

- Singh H, Lein DH, **Mathis SL**, Davis RD. Interplay of factors affecting vibration transmission to skeleton during standing: a narrative review. *International Journal of Applied Sports Science*. 2018 June; 30(1).
- Mesko NW, Wilson, RJ, Lawrenz JM, Mathieu JL, Ghiam MK, **Mathis SL**, Halpern JL, Schwartz HS, Holt GE. Pre-operative evaluation prior to soft tissue sarcoma excision – Why can't we get it right? *European Journal of Surgical Oncology*. 2018 Feb; 44(2):243-250. Impact factor: 3.522
- **Mathis SL** & Caputo JL. Resistance Training is Associated with Higher Lumbar Spine and Hip Bone Mineral Density in Competitive Male Cyclists. *Journal of Strength and Conditioning Research*. 2018 Jan; 32(1):274-279. Impact factor: 2.060
- Hansberger JT, Peng C, **Mathis SL**, Shanthakumar VA, Meacham SC, Lizhou C, Blakely VR. Dispelling the gorilla arm syndrome: The viability of prolonged gesture interactions. *International Conference on Virtual, Augmented and Mixed Reality, May 2017*: pp. 505-520. Impact factor: 3.700
- Archer KR, Devin CJ, Vanston SW, Koyama T, Phillips SE, **Mathis SL**, George SZ, McGirt MJ, Spengler DM, Aaronson OS, Cheng JS, Wegener ST. Cognitive-behavioral-based self-management approach to physical therapy: improving surgical spine outcomes. *The Journal of Pain*. 2016;17(1):76-89. Impact factor: 4.759
- **Mathis SL**, Farley RS, Fuller DK, Jetton A, Caputo JL, & Ishikawa S. Effects of a calcium supplement across a competitive season on bone mineral density in male cyclists. *Journal of Sports Medicine and Physical Fitness*. September 2015; 55(9): 940-945. Impact factor: 1.215
- Archer K, **Mathis SL**, Vanston S, Devin C, Spengler D, McGirt M, Cheng J, Aaronson O, Wegener S. A cognitive-behavioral based self-management approach to physical therapy: improving surgical spine outcomes. *The Journal of Pain*. 2014;15(4):S110. Impact factor: 4.759
- Archer KR, Seebach CL, **Mathis SL**, Riley LH 3rd, Wegener ST. Early postoperative fear of movement predicts pain, disability, and physical health 6 months after spinal surgery for degenerative conditions. *The Spine Journal*. 2014; 14(5):759-67. PMID: 24211099 Impact factor: 3.024
- Kay H, Sathiyakumar V, Archer KR, **Mathis SL**, Apfeld JC, Lee YM, Jahangir AA, Ehrenfeld J, Obremskey WT, Sethi MK. The homeless orthopaedic trauma patient: Follow-up, emergency room usage, and complications. *Journal of Orthopaedic Trauma*. 2014; 28(6):e128-32.
- **Mathis SL**, Farley RS, Fuller DK, Jetton A, & Caputo JL. Cortisol and Bone Mineral Density in Male Competitive Cyclists. *Journal of Sports Medicine*. May, 2013. <http://dx.doi.org/10.1155/2013/896821>
- Alamanda VK, Delisca GO, **Mathis SL**, Archer KR, Ehrenfeld JM, Halpern JL, Schwartz HS, Holt GE. The financial burden of re-excising incompletely excised soft tissue sarcomas: A cost analysis. *Annals of Surgical Oncology*. September 2013; 20(9):2808-14

- Alamanda VK, Crosby S, **Mathis SL**, Archer KR, Terhune K, Holt GE. Influence of resident education in correctly diagnosing extremity soft tissue sarcoma. *Sarcoma*. Epub April 18, 2013. DOI: 10.1155/2013/679323
- Morris BJ, Unger RZ, Archer KR, **Mathis SL**, Perdue AM, Obremskey WT. Risk Factors of Infection After ORIF of Bicondylar Tibial Plateau Fractures. *Journal of Orthopaedic Trauma*. 2013;27(9):e196-200. DOI: 10.1097/BOT.0b013e318284704e

Works under Review

- **Mathis SL**. Factors Associated with Mobility Apprehension in Persons with Lower-Limb Amputation. Submitted to *Journal of Prosthetics and Orthotics International*. In review.
- Hunter GR, Fisher G, Moellering DR, **Mathis SL**, Bamman MM, Windham ST. Inverse relationship between maximal aerobic capacity and biking economy prior to and after exercise training may be mediated by relationships between mitochondrial coupled and uncoupled respiration. Submitted to *Medicine and Science in Sport and Exercise*. In review.
- Hunter GR, Moellering DR, Windham ST, **Mathis SL**, Bamman MM, Fisher G. Relationship between VO_{2max} , cycle economy & mitochondrial respiration in untrained/trained. Submitted to *Journal of Applied Physiology*. Response to reviewers' comments submitted.
- Kang C, Sridhar M, Landrum DB, **Mathis SL**, and Aono H. Enhanced Aerodynamic Performance of Monarch Butterflies at High Altitudes. Submitted to *Nature*, March 2019. In review.

Works in Preparation

- Welch MW & **Mathis SL**. A novel model to identify factors associated with mobility apprehension in persons with lower-limb amputation. *Journal of Prosthetics and Orthotics*
- **Mathis SL**. Fear-Avoidance Behavior among Persons with Lower-Limb Amputation. *Archives of Physical Medicine and Rehabilitation*.
- Singh, H, **Mathis SL**, Carter SJ, Hunter GR. A Spring in Your Step: Exercise Training Increases Stretch-Shortening Cycle Potentiation and Walking Economy. *Medicine and Science in Sport and Exercise*
- **Mathis SL**, Watkins C, MacGregor G. Calcium lost through sweat: Is there evidence of bone remodeling due to cutaneous calcium loss during Bikram hot yoga? *Translational Journal of the American College of Sports Medicine*.
- **Mathis SL**, Anderson J, Connors R, Vazquez JA. Underwater treadmill training for lower-limb amputees. In progress: *Journal of Prosthetics and Orthotics*.

Seminars and Presentations

Speaking Presentations

American Orthotic and Prosthetic Association National Assembly, San Diego, CA. September 28, 2019. *A Theoretical Model to Understand Psychological and Physical Limitations in Lower-Limb Amputees*.

American College of Sports Medicine Annual Meeting, Orlando, FL. May 29, 2019. *A Spring in Your Step: Exercise Training Increases Stretch-Shortening Cycle Potentiation and Walking Economy.*

American Academy of Orthotists and Prosthetists 45th Annual Meeting and Scientific Symposium, Orlando, FL. March 7, 2019. “*Fear-Avoidance Behavior among Persons with Lower-Limb Amputation.*” *Winner of the Howard R. Thranhardt Lecture Series Award

American Orthotic and Prosthetic Association National Assembly, Vancouver, BC, Canada. September 27, 2018. *Factors Associated with Mobility Apprehension in Amputees.*

American College of Sports Medicine Annual Meeting, Orlando, Florida. May 28, 2014. *Factors Associated with Bone Mineral Density in Competitive Male Cyclists.*

American College of Sports Medicine Annual Meeting, Indianapolis, IN. May 29, 2013. *Effects of a Calcium Supplement on Bone Mineral Density in Male Cyclists.*

Poster Presentations (selected)

American College of Sports Medicine Annual Meeting, Minneapolis, MN. May 31, 2018. *Feasibility of Underwater Treadmill Training to Improve Mobility: A Case Study of a Transtibial Amputee.*

American Academy of Orthotists and Prosthetists Annual Meeting, New Orleans, LA. February 15, 2018. *Mobility apprehension in amputees.*

American College of Sports Medicine Annual Meeting, Denver, CO. June 1, 2017. *Calcium lost through sweat: Is there evidence of bone remodeling due to cutaneous calcium loss during Bikram hot yoga?*

American College of Sports Medicine Annual Meeting, Boston, MA. May 31, 2016. *Cortisol response during a bicycling competition.*

American College of Sports Medicine Annual Meeting, San Francisco, CA. May 30, 2012. *Cortisol and Bone Mineral Density in Male Competitive Cyclists.*

World Congress on Exercise is Medicine, Denver, CO. May 28, 2011. *Muscle Strengthening Exercise and Obesity among U.S. Adults.*

American College of Sports Medicine Annual Meeting; Denver, CO. May 31, 2011. *Effect of Strength Training on Cycling Endurance Performance: A Meta-Analysis.*

Seminars

Health Occupation Students of America International Leadership Conference. Nashville, TN. June 16, 2016. *Exercise and Medicine.*

Alabama State Association for Health, Physical Education, Recreation, and Dance. Hoover, AL, November 16, 2015. *Mountain Biking: A School Sport Promoting Lifetime Health and Fitness.*

Tennessee Association for Health, Physical Education, Recreation, and Dance. Murfreesboro, TN October 27, 2013. *Starting and Managing a High School Mountain Bike Team.*

Vanderbilt Center for Bone Biology, Nashville, TN January 11, 2013. *Clinical Research: From Enrollment to Statistics.*

Vanderbilt University School of Medicine, Department of Orthopaedics, Surgical Resident Education, Nashville, TN. October 12, 2012. *Stata 101: ANOVA and Regression.*

Vanderbilt University School of Medicine, Department of Orthopaedics, Surgical Resident Education, Nashville, TN September 28, 2012. *Stata 101: Introduction to Stata: A Focus on Resident Projects.*

Vanderbilt University School of Medicine, Department of Orthopaedics, Surgical Resident Education, Nashville, TN. September 14, 2012. *Research Methods: A Focus on Resident Projects.*

Vanderbilt University School of Medicine, Department of Orthopaedics, Surgical Resident Education Research Symposium. May 25, 2012. *Osteogenic Effect of Endurance Cycling.*

Graduate and Undergraduate Research Activities

Graduate Student Mentor Activities

- Dissertation committee member: Madhu Sridhar is pursuing a Ph.D. in Mechanical Engineering at UAH. Role: advise and oversee statistical analyses of data from measurements of the variation of body and wing kinematics in butterflies during flight at high altitude.
- Master's thesis committee chair: Sims Kirkland Lawson is pursuing an MS in Biological Sciences at UAH. Kirk is studying the effect of Attention Deficit-Hyperactivity Disorder medication on the bone mineral density in young adults.

Undergraduate Student Research Mentor Activities (selected)

- Kristina Y. Shearod, Alexa V. Convers, Tjahane Holmes, Shannon L. Mathis. Effects of Boxing Training on Cognitive and Physical Function in Patients with Parkinson's disease. ACSM Annual Meeting in Minneapolis, MN, June 2018. UAH Research Horizon's Day, Huntsville, AL, April 18, 2018. Posters at the Capitol, Montgomery, AL, February 22, 2018.
- Frederick R. Measuring the effects of the Alexander Technique on posture and tension in student violinists and violists. *Perpetua*, Volume 2, Issue 2. April, 2018.
- D. Walls, B. Carter, B. Taylor, T. Harrison, K. Shearod, R. Connors, S. Mathis. February 18, 2017. Factors Associated with a High HbA1c Level among U.S. Adults. Southeastern ACSM Annual Meeting Presentation.

Research Experience

Staff Scientist

Vanderbilt University Medical Center (VUMC), Department of Orthopaedic Surgery and Rehabilitation, Nashville, TN

- Taught and mentored medical students, residents and fellows during development of research projects
- Performed statistical analyses using Stata for orthopaedic resident research projects serving as co-author on manuscripts and posters
- Developed reports of results in tables and graphs of research findings
- Performed statistical analyses for research projects with psychosocial outcomes
- Assisted PI in manuscript preparation for scientific journals
- Wrote grant for PI funded by the National Institute on Disability and Rehabilitation Research. *Improving Trauma Outcomes: A Goal Management Approach*; \$384,000

Project Coordinator

Vanderbilt University Medical Center; Funded by the National Institutes of Health (R21)
Cognitive Behavioral Based Physical Therapy: Improving Surgical Spine Outcomes

- Developed and maintained Vanderbilt Institutional Review Board documentation, Investigator Binder, Manual of Operations, and RedCap database
- Developed RedCap user interface for participants to answer questionnaires using an iPad
- Recruited participants, supervised and assisted research assistants in recruitment efforts ($n = 130$), scheduling, testing, and follow-up with participants' visits (3 return visits)
- Maintained database of all patients who had spine surgery from five surgeons recording information provided in Starpanel, VUMC's electronic medical record
- Performed a physiologic measurement of pain on 3 anatomical areas using a pain algometer (Wagner Instruments)
- Wrote midterm progress report to the NIH

Database Manager

Vanderbilt University Medical Center. *The effect of psychosocial risk factors on outcomes following ACL reconstruction*

- Developed and maintained Vanderbilt Institutional Review Board documentation
- Developed and maintained Investigator Binder and Manual of Operations
- Designed SurveyMonkey survey of psychosocial questionnaires including Tampa Scale for Kinesiophobia, Pain Catastrophizing Scale, Brief Pain Inventory, SF-12 Health Survey, Return to Sport
- Performed data quality checks

Teaching

Kinesiology/Exercise Science

- Research Methods (MS and BS)
- Statistics for the Behavioral Sciences
- Physiology of Exercise
- Applied Research in Exercise Science
- Measurement and Evaluation
- Exercise Prescription and Assessment for Healthy and Special Populations (MS and BS)
- Sport Nutrition
- Internship in Exercise Science

Mathematics

- Statistics for the Behavioral Sciences
- Elementary Statistics
- Calculus I
- College Algebra
- Intermediate Algebra
- Mathematics for the Liberal Arts

Other Work Experience

2015 Adjunct Instructor, Lipscomb University, MS in Exercise and Nutrition Science
2014 Adjunct Instructor, Cumberland University, MS in Sport and Exercise Science
2011 Research Specialist, Vanderbilt University Medical Center
2010 Adjunct Instructor, Middle Tennessee State University, BS in Exercise Science
2009 Bio-Medical Technology Instructor, Tennessee Technology Center
2007 Adjunct Instructor, University of Tennessee, Chattanooga, TN, BS Mathematics
2002-2004 Instructor, Belmont University, BS Mathematics
2001-2002 Adjunct Instructor, Nashville State Community College, Nashville, TN
2001-2002 Database Marketing Analyst, LifeWay Christian Stores, Nashville, TN
2000 Software Test Engineer, SkyTel, a WorldCom Company, Advanced Technology Center, Jackson, MS
1998-1999 Graduate Teaching Assistant, Mississippi College Mathematics Department
1999 Mathematical Consultant, Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

Community Partnerships and Volunteer Service

- Tennessee Chapter of National Interscholastic Cycling Association, Coaching Education and Skills Coordinator, 2013 – 2015
- Endeavor Performance Cycling Development Camp, co-coordinator and coach, 2013
- USA Cycling Junior Development Camp, coach, 2007 – 2010
- Scenic City Velo Cycling Club, Cycling Development Camp, coach, 2011

Other Memberships and Activities

- Team Belladium – Elite women’s road cycling racing team, 2013 – 2016
- Team Vantaggio-Trek – Elite women’s mountain bike racing team, 2005 – 2012
- National Series Champion, National Off-Road Mountain Bike Association, 2006
- 5th place, Master’s World Mountain Bike Championship, Kamloops, BC, 2006
- Team DeFeat – Elite women’s road cycling racing team, 2004
- USA Cycling Certified Level II Cycling Coach, 2004-2013
- Pi Mu Epsilon, Mathematics Honors Society, 1996-1999
- Vice President, Mathematics Association of America: Mississippi College, 1997-1998