

CURRICULUM VITAE
Michael D. Harris, PhD

Contact Information

Program in Physical Therapy
Washington University School of Medicine
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Present Position

Assistant Professor of Physical Therapy
Assistant Professor of Orthopaedic Surgery
Washington University in St Louis School of Medicine

Assistant Professor of Mechanical Engineering and Materials Science
Washington University in St Louis

Research Discipline Specialization: Orthopaedic Biomechanics

Education

2007	Bachelor of Science in Biomedical Engineering University of Utah Salt Lake City, UT
2013	PhD in Bioengineering University of Utah Salt Lake City, UT Dissertation Title: The Geometry and Mechanics of Normal and Pathomorphologic Human Hips

Academic Positions / Employment

08/2008 – 04/2013	Graduate Research Assistant Orthopaedic Research Laboratory University of Utah, Salt Lake City, Utah Advisor: Dr. Andrew Anderson, PhD
04/2013 – 10/2015	Postdoctoral Research Fellow Center for Orthopaedic Biomechanics University of Denver, Denver, Colorado Mentor: Kevin Shelburne, PhD
12/2015 – 6/2016	Instructor, Program in Physical Therapy Instructor, Department of Orthopaedic Surgery Washington University School of Medicine, St Louis, Missouri

7/2016 – present

Assistant Professor, Program in Physical Therapy
Assistant Professor, Department of Orthopaedic Surgery
Assistant Professor, Department of Mechanical Engineering and Materials Science
Washington University School of Medicine, St Louis, Missouri

Teaching Title and Responsibilities

Course Master	IPMS 5510 Movement Science II – Biomechanics (2019 – present) Washington University School of Medicine, Program in Physical Therapy
Instructor	IPMS Case Integration III (2017 - present) Biomechanics research tools and application for physical therapists Washington University School of Medicine, Program in Physical Therapy
Guest Lecturer	MEMS 5564 Orthopaedic Biomechanics – Cartilage/Tendon (2016 - present) Washington University, Department of Mechanical Engineering and Material Science
Guest Lecturer	IPMS 5850 Movement Science Program Seminar (2018 - present) Washington University School of Medicine, Program in Physical Therapy
Guest Lecturer	BME 4200 Biomechanics (2016) St Louis University, Department of Biomedical Engineering
Guest Instructor	DEA III (Diagnosis, Evidence and Analysis in PT) (2021, 2022) Washington University School of Medicine, Program in Physical Therapy

Honors and Awards

2006-2007	Biomedical Engineering Society Student Chapter Officer, University of Utah
2006 – present	Tau Beta Pi National Engineering Honor Society
2007	University of Utah Undergraduate Research Scholar
2007	1 st Place Bioengineering Undergraduate Research Symposium
2008	Campbell Endowed Graduate Fellowship recipient from the University of Utah College of Engineering
2009, 2010	University of Utah Graduate Student Travel Award
2010, 2011, 2012	Obyn Memorial Endowed Scholar in the Department of Orthopaedics
2011	David R. and Isabelle E. Atherton Scholarship in the School of Medicine recipient
2012	Featured cover article for the July 2012 issue of the <i>Journal of Orthopaedic Research</i>
2012	LSPeery Discovery Program in Musculoskeletal Restoration Scholar
2012	University of Utah Orthopaedic Center Bone Award
2016	Washington University Musculoskeletal Research Center Winter Symposium Travel Award – Best Poster
2020	American Society of Biomechanics Junior Faculty Research Award
2022	Orthopaedic Research Society Collaborative Research Award
2022	William H Harris Hip Award from the Journal of Orthopaedic Research and the Orthopaedic Research Society

Editorial Responsibilities

Reviewer	Orthopaedics journals: <i>Journal of Orthopaedic Research, Journal of Bone and Joint Surgery, Geriatric Orthopaedic Surgery and Rehabilitation</i>
Reviewer	Biomechanics journals: <i>Journal of Biomechanics, Journal of Biomechanical Engineering, Clinical Biomechanics, Journal of Applied Biomechanics</i>
Reviewer	Biomedical Engineering journals: <i>Annals of Biomedical Engineering, Computer Methods in Biomechanics and Biomedical Engineering, Journal of Engineering in Medicine, Frontiers in Bioengineering and Biotechnology</i>
Reviewer	General Science and Medicine journals: <i>The Anatomical Record, PLOS ONE</i>

Community Service Contributions

Grant Reviewer	Orthopaedic Research and Education Foundation research grants (2017, 2022) Action Medical Research for children (UK) (2019)
Abstract Reviewer	Orthopaedic Research Society Annual Meeting (2017 - present) International Society of Biomechanics (2018) American Society of Biomechanics Annual Meeting (2019 - present)
Scientist Reviewer	Congressionally Directed Medical Research Programs, Peer Reviewed Medical Research Program (2016, 2017, 2019, 2020)
Committee Member	American Society of Biomechanics Education Committee (2019 - 2023) American Society of Biomechanics Membership Committee (2023 - present)
Program Committee	ISHA – The Hip Preservation Society Annual Meeting (2020 - 2021)
Committee Member	International Hip Dysplasia Institute Biomedical Research Group
Moderator	Orthopaedic Research Society Annual Meeting (2017 - present) American Society of Biomechanics Annual Meeting (2021 – present)
Judge	World Congress of Biomechanics, Student Paper Competition (2014) Washington University Musculoskeletal Research Center Winter Symposium (2019) Washington University School of Medicine 14 th Annual Research Training Symposium (2019) Annual Biomedical Research Conference for Minoritized Scientists, Student Paper Competition (2023)
Council Member	Research Advisory Council – Washington University Program in Physical Therapy (2015 – present)
Faculty Organizer	National Biomechanics Day outreach program (Washington University) (2017 - present)
Volunteer	Meals on Wheels of Greater St Louis driver (2019 – 2021) St Louis Area Foodbank (2018 – present)
Podcast Guest	Moving Ahead – The Physical Therapy Podcast from Washington University in St Louis (Fall 2021)

- Conference Organizer 2022 Washington University Hip Research Retreat: Enhancing Multi-Disciplinary Collaboration for Impactful Young Adult Hip Research (Spring 2022)
- Webinar Guest United States Bone and Joint Initiative – Bone and Joint Connection: A Discussion on the Importance of Mentorship (March 6, 2023)
- Conference Organizer 2023 Washington University Hip Research Retreat (April 6, 2023)

Professional Societies and Organizations

- 2006 – present Tau Beta Pi, Engineering Honor Society
2015 – 2017 American College of Sports Medicine
2015 – 2017 Gait and Clinical Movement Analysis Society
2015 – present Washington University Institute of Clinical and Translation Sciences
2016 – present Orthopaedic Research Society
2016 – present American Society of Biomechanics
2017 – present Washington University Musculoskeletal Research Center
2023 – present Artificial Intelligence and Internet of Things for Medicine (AIM) Institute

Invited Talks and Lectures

- 2016 Multi-joint mechanics during gait in young adults with acetabular dysplasia. *Shirley Sahrman Movement System Impairment Retreat*, Columbia, IL, Feb 27-29, 2016.
- 2017 Finding the hip joint center in healthy and pathologic hips. *Shirley Sahrman Movement System Impairment Retreat*, Columbia, IL, Mar 4-6, 2017.
- 2017 The role of muscle in hip dysplasia pathomechanics. *Wyss Hip and Pelvis Structure: A Cross-Pollination Collaborative*, Seattle, WA, Oct 20-21, 2017.
- 2017 Movement science research update - Muscle and hip dysplasia pathomechanics. *Washington University Program in Physical Therapy 75th Anniversary*, St Louis, MO, Nov 10-11, 2017.
- 2018 Science or Industry? The pros, cons, and considerations for young scientists. *Washington University Program in Physical Therapy Movement Science Seminar*, St Louis, MO, Feb 13, 2018.
- 2018 Roles, Responsibilities, and Expectations when transitioning from graduate student to postdoc to junior faculty. *Washington University Program in Physical Therapy Movement Science Seminar*, St Louis, MO, May 8, 2018.
- 2018 Obtaining a NIH Career Development Award. *Washington University Program in Physical Therapy Movement Science Seminar*, St Louis, MO, Oct 23, 2018.
- 2019 Muscle Performance Pre- and Post-Periacetabular Osteotomy. *2019 Musculoskeletal Research Center Winter Symposium*. St Louis, MO; Feb 20, 2019.
- 2019 Muscle Biomechanics in Developmental Dysplasia of the Hip. *University of Arkansas Orthopaedic Research Series*. Little Rock, AR, Feb 25, 2019.
- 2019 Bone & Muscle Biomechanics in Hip Dysplasia. *2019 Shirley Sahrman Movement System Impairment Retreat*, Columbia, IL, Mar 3-6, 2019.
- 2019 Biomechanics: Understanding the What, Why, and How of the Way We Move. *2019 Barnes-Jewish Corporation Communication and Marketing Conference*, St Louis, MO, Aug 15, 2019.
- 2019 How Hip Dysplasia Affects Muscle-Driven Mechanics in Young Adults. *2nd Annual International Hip Dysplasia Symposium*, New York City, NY, Sept 11-13, 2019.

- 2019 Biomechanical and Imaging Evaluation Techniques for Optimum PAO Outcomes. *2nd Annual International Hip Dysplasia Symposium*, New York City, NY, Sept 11-13, 2019.
- 2019 More to the story: How Bony Deformity Changes Muscle Mechanics at the Hip. *Saint Louis University Parks College of Engineering Research Seminar Series*, St Louis, MO, Oct 29, 2019.
- 2020 Muscle-Driven Biomechanics in Hip Dysplasia. *Orthopaedic Research Society Research Interest Group: Hip Dysplasia and Other Structural Hip Disorders*, Phoenix, AZ, Feb 10, 2020.
- 2021 Muscle Pathomechanics in Hip Dysplasia: Insights from Musculoskeletal Modeling and Probability Analysis. *Orthopaedic Research Society Workshop: Redefining hip dysplasia and instability mechanics using biomechanical metrics*, virtual conference, Feb 13, 2021.
- 2021 Science and Faith: A Harmonious Search for Truth. *Washington University Christian Medical Association*, St Louis, MO, Mar 29, 2021
- 2021 How Treating Skeletal Deformities changes Muscle Mechanics in Patients with Hip Dysplasia. *2021 Washington University Musculoskeletal Research Symposium*, St Louis, MO, May 7, 2021.
- 2022 Developing a More Complete Picture of Joint Biomechanics in Patients at High Risk for Hip Osteoarthritis. *Washington University Physical Therapy Research Seminar Series*, St Louis, MO, Nov 16, 2021.
- 2022 Abnormal Bone, Abnormal Muscle – Recent developments in our understanding of the pathomechanics of hip dysplasia. *University of Ottawa Division of Orthopaedic Surgery Grand Rounds*, Ottawa, ON, May 11, 2022.
- 2022 Lessons Learned about Successful Transition from K award to R01. *United States Bone and Joint Initiative Young Investigators Initiative Workshop*, Chicago, IL, Oct 21-23, 2022.
- 2023 Multi-faceted Biomechanical Contributors to Damage in Dysplastic Hips. *Arthritis Foundation Hip Osteoarthritis Clinical Studies Conference*, New York, NY, Feb 16-18, 2023.
- 2023 The Interactions of Bone, Muscle, and Movement as Contributors to Damage in Dysplastic Hips. *Leon Root Motion Analysis Laboratory at Hospital for Special Surgery*, New York, Feb 16, 2023.
- 2023 Hip Dysplasia – It’s Not Just a Shallow Socket. *American Physical Therapy Association Combined Sessions Meeting Educational Presentation*, San Diego, CA, Feb 23, 2023.

Research Support

Ongoing

R01AR081881 NIH/NIAMS 2/10/2023 – 12/31/2027
Longitudinal Biomechanics and Patient-Reported Outcomes after Periacetabular Osteotomy for Developmental Dysplasia of the Hip
Role: PI

K01AR072072 NIH/NIAMS (\$554,225) 4/1/2018 – 6/30/2023
Muscle Geometry and its Influence on Function in Patients with Developmental Dysplasia of the Hip
Role = PI

Pending

Completed

5R01HL077683-08 NIH/NHLBI (\$1,600,000) 1/1/2004 – 6/30/2008
PI = Jeff Weiss

Angiogenesis and the Extracellular Matrix

Role: Undergraduate Research Assistant (execution)

1R01AR053344 NIH/NIAMS (\$1,800,000) 7/1/2007 – 6/30/2013

PI = Jeff Weiss (co-I= Andrew Anderson, co-I= Chris Peters)

Biomechanics of the Dysplastic Hip

Role: Research Assistant (methodology, execution)

Interdisciplinary Research Seed Grant (\$11,000) 1/1/2010 – 12/31/2011

PI = Chris Peters (co-I = Ross Whitaker)

Statistical Shape Modeling of Femoroacetabular Impingement

Role: Graduate Research Assistant (methodology, execution)

S10-RR026565 (\$222,000) 4/1/2010 – 5/21/2012

PI = Andrew Anderson (co-Is = Ingrid Nygaard, Chris Peters, Jeff Weiss, Kent Bachus, Jeff Weiss, Dick Norman, Bruce MacWilliams, Stacey Bamberg, Jim Martin, David Carrier, Paul LaStayo, Roy Bloebaum, Ken Foreman, Lee Dibble, Greg Clark)

Tandem Instrumented Treadmill for Accurate Assessment of in-vivo Joint Kinetics

Role: Graduate Research Assistant (writing, submission, execution)

1I01RX000262-01A1 (\$750,000) 10/1/2010 – 9/30/2013

VA: RR&D Merit Review Award (Parent I01)

PI=Kent Bachus (co-Is= Robert Tashjian, Roy Bloebaum, Gregory Stoddard)

Predicting Skeletal Stability of Endoprostheses for Above Elbow Amputee

Role: Graduate Research Assistant (writing, methodology, execution)

National Center for Simulation in Rehab. Research (\$15,000) 6/27/2011 – 9/1/2011

Visiting Scholar and Professor – Stanford University

PI = Andrew Anderson

Coupling Patient-Specific Finite Element Analysis with Musculoskeletal Modeling to study Acetabular Dysplasia and Femoroacetabular Impingement

Role: Graduate Research Assistant (writing, methodology, execution)

University of Utah Seed Grant (\$28,000) 7/1/2011 – 12/31/2012

PIs= Heath Henninger, Robert Tashjian

In Vivo Determination of Scapula Kinematics after Reverse Total Shoulder Arthroplasty

Role: Graduate Research Assistant (methodology, execution)

R21-AR3466184 (\$411,125) 12/1/2012 – 11/30/2014

PI = Andrew Anderson (co-I= Chris Peters, Bo Foreman)

Musculoskeletal and Finite Element Modeling of Femoroacetabular Impingement

Role: Research Associate (writing, submission, methodology)

Knoebel Center for the Study of Aging Pilot Grant (\$64,000) 5/1/2014-6/1/2015

PI = Bradley Davidson (Co-PI Kevin Shelburne)

Improving rehabilitation after Lower-extremity Joint replacement Surgery by considering regional Interdependence in the Musculoskeletal System

Role: Postdoctoral Researcher (conceptualization, writing, execution)

R01EB015497 NIH/NIBIB (\$1,150,000) 8/1/2012 – 8/1/2016
PI = Kevin Shelburne
Multi-scale Finite Element Musculoskeletal Modeling Framework Applied to Current Issues in Joint Replacement
Role: Postdoctoral Researcher (execution)

R01-EB016701 (\$1,699,034) 4/1/2013 – 3/31/2017
PI = Andrew Anderson (co-I= Jeff Weiss, Chris Peters, Ross Whitaker)
Population-Based Shape and Biomechanical Analysis of Hip Pathoanatomy
Role: Research Associate (writing, submission, methodology)

DePuy Synthes (\$758,708) 3/2015 – 3/2017
PI = Paul Rullkoetter
A Proposal for Research Partnership in Total Hip Replacement
Role: Postdoctoral Researcher (methodology, execution)

7/2016 – 5/2017
Washington University Program in Physical Therapy Pilot Funding Award (\$2,000)
Carbon Fiber Off-loading Ankle Foot Orthosis Design Optimization
Role = PI

R41DK109731-01 NIH/NIDDK (\$186,737) 5/24/2016 – 5/23/2018
PI = Michael Dailey, Dequan Zou
Carbon Fiber Off-Loading Orthosis
Role = Co-Investigator (methodology, execution)

Washington University Musculoskeletal Research Center 2018 Pilot & Feasibility Award
Year 2 (competitive renewal) – (\$40,000) 4/1/2019 – 6/30/2020
Year 1 - (\$40,000) 4/1/2018 – 3/31/2019
Awarded through NIH/NIAMS P30AR057235 (Y1), P30AR074992 (Y2) (PI = Silva)
Muscle Performance after Periacetabular Osteotomy
Role = PI

L'Oreal USA for Women in Science Fellowship 10/25/2018 – 6/30/2020
(PI = Gaffney)
Quantification of bone shape variability, whole-body and joint level biomechanics of hip dysplasia
Role = Mentor

F32 AR075349 NIH/NIAMS NRSA Postdoctoral fellowship 4/1/2019 – 10/31/2020
(PI = Gaffney)
Effects of simulated interventions on hip articular cartilage loading in patients with femoroacetabular impingement and development dysplasia of the hip
Role = Sponsor

American Society of Biomechanics Junior Faculty Research Award 7/1/2020-06/30/2022
The Biomechanical Consequences of Femoral Version Deformity and Surgical Correction in Patients with Hip Dysplasia
Role: PI

Orthopaedic Research Society Collaborative Research Award 9/1/2021 – 12/31/2022
Role: PI

Trainee / Mentee Record

Mentee Awards / Honors	2018-2020 L'Oreal USA Women for Science Fellow (Brecca Gaffney) 2018 American Society of Biomechanics Student Travel Award recipient (Ke Song) 2019-2021 NIH NRSA F32 Fellowship Recipient (Brecca Gaffney) 2020 American Society of Biomechanics PhD 3 minute-thesis 1 st Place winner (Ke Song) 2021 Orthopaedic Research Society Student Member Award (Ke Song) 2022 NCAA Postgraduate Scholarship (Christina Bourantas) 2023 American Society of Biomechanics Grant in Aid (Molly Shepherd) 2023 Steven J Rose Physical Therapy Research Award (Tina Wu)
PhD Primary Advisor	Ke Song, MS – PhD candidate, Mechanical Engineering; Washington University in St Louis (2016 – 2021) Next position(s): postdoctoral fellow at University of Pennsylvania Molly Shepherd, BS – PhD student, Movement Science; Washington University in St Louis (2020 – present) Christina Bourantas, BS – PhD student, Movement Science; Washington University in St Louis (2022 – present)
Postdoctoral Mentor	Brecca Gaffney, PhD – Postdoctoral Scholar, Program in Physical Therapy; Washington University in St Louis (2017 – 2020) Next position(s): Assistant Professor at University of Colorado-Denver
Supervisor	Carly Krull – BS student (class 2018), Biomedical Engineering Washington University in St Louis; Independent Study (2017) Work-study research assistant (2018); Next position(s): research engineer at Ohio State University; PhD student at Washington University in St Louis Julia Blumkaitis, BA – Research Assistant; Washington University in St Louis (2018); Next position(s): MS candidate at Lindenwood University Jacqueline Foody – BS student (class 2019), Biomedical Engineering; Washington University in St Louis Independent Study (2018) Research Assistant (2018 – 2019); Next position(s): researcher at Steadman-Phillipon Research Institute; PhD student at Duke University Paige Burnett – BS student (class of 2021), Biomedical Engineering, minor in Computer Science; Washington University in St Louis Research Assistant (2019-2021); Next position(s): research engineer at Zimmer Biomet Molly Shepherd – BS student (class 2019), Washington University in St Louis

Independent Study (2018)
Research Assistant (2018 – 2020)
Next position(s): PhD student at Washington University in St Louis

Spencer Williams – BS student (class of 2022), Biomedical Engineering;
Washington University in St Louis
Independent Study (2019)
Research Assistant 2020 – 2022
Next position(s): PhD student at Rice University

Rannon Huo – BS student, Biomedical Engineering
Washington University in St Louis
Independent Study (2021)
Research Assistant (2022 – present)

Aspen Chadderdon – BS/MS student, Biomedical Engineering
Washington University in St Louis
Independent Study (2022)
Research Assistant (2023 – present)

Riley Silfies – BS student, Biomedical Engineering
Washington University in St Louis
Research Assistant (2023 – present)

PhD Committee Member

Elinor Harrison – PhD candidate, Movement Science;
Washington University in St Louis (2017–2019);
Next position(s): Postdoctoral Fellow at Washington University School
of Medicine

Christian Weber – PhD candidate, Biomedical Engineering
Washington University in St Louis (2017–2019);
Next position(s): Engineer at Centene Corporation

Alex Reiter – PhD candidate, Mechanical Engineering and Materials
Science; Washington University in St Louis (2018 – 2021);
Next position(s): postdoctoral scholar at University of Wisconsin-
Madison; faculty St Louis University engineering

Quenten Hooker – PhD candidate, Movement Science;
Washington University in St Louis (2019–2021);
Next position(s): development engineer at Callaway Golf

Nicole Migotsky – PhD candidate, Biomedical Engineering;
Washington University in St Louis (2020 – 2023)
Next position(s): staff scientist at University of Michigan

David May – PhD candidate, Movement Science;
Washington University in St Louis (2020 – 2022)
Next position(s): product developer at Boston Scientific

Lauren Tueth – PhD candidate, Movement Science;
Washington University in St Louis (2021 – present)

MS Committee Member	Clarissa Levasseur, BS – MS student, Biomedical Engineering St Louis University (2016–2017); Next position(s): Research Engineer at University of Pittsburgh Biodynamics Laboratory
Committee Member	Quenten Hooker – TL1 Predoctoral Clinical Research Program, Washington University in St Louis (2018 – 2020) Next position(s): development engineer at Calloway Golf
External Thesis Examiner	Evy Meinders – PhD student, Griffith University (2022)
Independent Study Mentor	Divya Joshi – BS student (class 2018), Biomedical Engineering Washington University in St Louis (2017) Maria Wanner – BS student (class 2019), Biomedical Engineering Washington University in St Louis (2018) Abby Matt – BS (class of 2022), Biomedical Engineering Washington University in St Louis (2019-2020) Elizabeth Saliba – BS student (class of 2022), Mechanical Engineering, Washington University in St Louis (2020) Simran Wadhwa – BS student, Biomedical Engineering Washington University in St Louis (2021) Ella Hanson – BS student, Biomedical Engineering Washington University in St Louis (2021)
Research Advisor	Hannah Steele, BS – DPT student & Research Assistant Washington University in St Louis (2016) Lauren Westen, BS – DPT student & Research Assistant Washington University in St Louis (2017 – 2019) Benjamin Hardin, BS – DPT student & Research Assistant Washington University in St Louis (2020 - 2021) Tina Wu, BS – DPT student & Research Assistant Washington University in St Louis (2020 - 2023) Stephanie Miller – DPT student and Research Assistant Washington University in St Louis (2022 – present) Emma Behrman – BS student, Villanova University Advanced Summer Program for Investigation & Research Education student (2023)

BIBLIOGRAPHY:

Peer-reviewed Journal Articles

1. Henak CR, Ellis BJ, **Harris MD**, Anderson AE, Peters CL, Weiss JA: Role of the acetabular labrum in load support across the hip joint. *Journal of Biomechanics*. 2011 Aug; 44(12):2201-2206. PMC3225073
2. Hansen BJ, **Harris MD**, Anderson LA, Weiss JA, Peters CL, Anderson AE: Correlation between radiologic measures of acetabular morphology with 3D femoral head coverage in patients with acetabular retroversion. *Acta Orthopaedica*. 2012 Jun; 83(3): 233-239. PMC3369147
3. **Harris MD**, Anderson AE, Henak CR, Ellis BJ, Peters CL, Weiss JA: Finite element prediction of cartilage contact stresses in normal human hips. *Journal of Orthopaedic Research*. 2012 Jul; 30(7):1133-1139. PMC3348968 (cover article)
4. Barg A, **Harris MD**, Henninger HB, Amendola RL, Saltzman CL, Hintermann B, Anderson AE: Medial distal tibial angle: comparison between weight-bearing mortise view and hindfoot alignment view. *Foot and Ankle International*. 2012 Aug; 33(8):655-661.
5. **Harris MD**, Reese SP, Weiss JA, Peters CL, Anderson AE: Three-dimensional quantification of femoral head shape in controls and patients with cam-type femoroacetabular impingement. *Annals of Biomedical Engineering* 2013 Jun; 41(6): 1162-1171. PMC3640621
6. Henak CR, Carruth EC, Anderson AE, **Harris MD**, Ellis BJ, Peters CL, Weiss JA: Finite element predictions of cartilage contact mechanics in hips with retroverted acetabula. *Osteoarthritis and Cartilage*. 2013 Oct; 21(10): 1522-1529. PMC3779536
7. **Harris MD**, Datar M, Jurrus ER, Whitaker RT, Peters CL, Anderson AE: Statistical shape modeling of cam femoroacetabular impingement. *Journal of Orthopaedic Research* 2013 Oct; 31(10): 1620-1626. PMC4137561
8. **Harris MD**, Kapron AL, Peters CL, Anderson AE: Correlations between the alpha angle and femoral head asphericity: Implications and recommendations for the diagnosis of cam femoroacetabular impingement. *European Journal of Radiology* 2014 May; 83(5): 788-796. PMC4002001
9. Ivester J, Cyr AJ, **Harris MD**, Kulis M, Rullkoetter P, Shelburne KB: A reconfigurable high-speed stereo-radiography system for sub-millimeter measure of in-vivo joint kinematics. *ASME Journal of Medical Devices* 2015, 9(4):041009-041009-7.
10. Gaffney BM, **Harris MD**, Davidson BS, Stevens-Lapsley JE, Christiansen CL, Shelburne KB: Multi-joint compensatory effects of unilateral total knee arthroplasty during high-demand tasks. *Annals of Biomedical Engineering* 2016 Aug; 44(8):2529-2541. PMC4907879
11. **Harris MD**, Cyr AJ, Azhar AA, Fitzpatrick CK, Rullkoetter PJ, Maletsky LP, Shelburne KB: A combined experimental and computational approach to subject-specific analysis of knee joint laxity. *Journal of Biomechanical Engineering* 2016 Aug; 138(8). PMC4967880
12. **Harris MD**, MacWilliams BA, Foreman KB, Peters CL, Weiss JA, Anderson AE: Higher medially directed joint reaction forces are a characteristic of dysplastic hips: a comparative study using subject-specific musculoskeletal models. *Journal of Biomechanics* 2017 Mar 21, 54:80-87. PMC5939935 (highlighted article)

13. Ali AA, **Harris MD**, Shalhoub S, Maltesky LP, Rullkoetter PJ, Shelburne KB: Combined measurement and modeling of specimen-specific knee mechanics for healthy and ACL-deficient conditions. *Journal of Biomechanics* 2017 May 24; 54:117-124. PMC5541933 (highlighted article)
14. Atkins PR, Elhabian SY, Agrawal P, **Harris MD**, Whitaker RT, Weiss JA, Peters CL, Anderson AE: Quantitative comparison of cortical bone thickness using statistical shape modeling in patients with cam femoroacetabular impingement. *Journal of Orthopaedic Research* 2017 Aug ; 35(8):1743-1753. PMC5407942
15. Pascual-Garrido C, **Harris MD**, Clohisy JC: Innovations in joint preservation procedures for the dysplastic hip “the periacetabular osteotomy.” *Journal of Arthroplasty* 2017 Sep; 32(9S): S32-S37.
16. Kefala V, Cyr AJ, **Harris MD**, Hume DR, Davidson BS, Shelburne KB: Assessment of knee kinematics in older adults using high-speed stereo radiography. *Medicine and Science in Sports and Engineering* 2017 Nov; 49(11):2260-2267. PMC8230732
17. Pascual-Garrido C, Guilak F, Rai MF, **Harris MD**, Lopez MJ, Todhunter RJ, Clohisy JC: Canine hip dysplasia: a natural animal model for human developmental dysplasia of the hip. *Journal of Orthopaedic Research* 2018 Jul; 36(7): 1807-1817.
18. Hume DR, Kefala V, **Harris MD**, Shelburne KB: Comparison of marker-based and stereo radiography knee kinematics in activities of daily living. *Annals of Biomedical Engineering* 2018 Nov; 46(11):1806-1815. PMC7757735
19. *Song K, Anderson AE, Weiss JA, **Harris MD**: Musculoskeletal models with generic and subject-specific geometry estimate different joint biomechanics in dysplastic hips. *Computer Methods in Biomechanics and Biomedical Engineering* 2019 Feb; 22(3):259-270. PMC6478547
20. *Gaffney BMM, Hillen TJ, Nepple JJ, Clohisy JC, **Harris MD**: Statistical shape modeling of femur shape variability in female patients with hip dysplasia. *Journal of Orthopaedic Research* 2019 Mar; 37(3):665-673. PMC6613213
21. *Gaffney BMM, Clohisy JC, Van Dillen LR, **Harris MD**: The association between periacetabular osteotomy reorientation and hip joint reaction forces in two subgroups of acetabular dysplasia. *Journal of Biomechanics* 2020 Jan 2; 98:109464. PMC6930321
22. Harris-Hayes M, Hillen TJ, Commean PK, **Harris MD**, Mueller MJ, Clohisy JC, Salsich GB: Hip kinematics during single leg squat and step down in people with and without hip-related groin pain: are kinematics associated with hip muscle strength and bony morphology? *Journal of Orthopaedics and Sports in Physical Therapy* 2020 May; 50(5): 243-251. PMC7196020
23. *Song K, Gaffney BMM, Shelburne KB, Pascual-Garrido C, Clohisy JC, **Harris MD**: Dysplastic Hip Anatomy Alters Muscle Moment Arm Lengths, Lines of Action, and Contributions to Joint Reaction Forces during Gait. *Journal of Biomechanics* 2020 Sep 18; 110:109968. PMC7737424
24. Schwabe M, Clohisy JC, Cheng AL, Pascual-Garrido C, Harris Hayes M, Hunt DM, **Harris MD**, Prather H, Nepple JJ: Short-term clinical outcomes of hip arthroscopy versus physical therapy in patients with femoroacetabular impingement: a systematic review and meta-analysis of randomized controlled trials. *Orthopaedic Journal of Sports Medicine* 2020 Nov 17; 8(11):2325967120968490. PMC7678402

25. Foster SN, **Harris MD**, Hasting MK, Mueller MJ, Salsich GB, Harris-Hayes M: Static ankle dorsiflexion and hip and pelvis kinematics during forward step-down in patients with hip-related groin pain. *Journal of Sport Rehabilitation* 2020 Dec 8; 30(4):638-645. PMC8184886
26. *Gaffney BMM, Harris-Hayes M, Clohisy JC, **Harris MD**: Effect of Simulated Rehabilitation on Hip Joint Loading during Single Limb Squat in Patients with Hip Dysplasia. *Journal of Biomechanics* 2021 Feb 12; 116:110183. PMC7938363
27. *Gaffney BMM, Van Dillen LR, Foody JN, Burnet PE, Clohisy JC, Chen L, **Harris MD**: Multi-joint biomechanics during sloped walking in patients with developmental dysplasia of the hip. *Clinical Biomechanics* 2021 Apr; 84:105335. PMC8845490
28. Fowler LM, Nepple JJ, Devries C, **Harris MD**, Clohisy JC: Medialization of the hip's center with periacetabular osteotomy: validation of assessment with plain radiographs. *Clinical Orthopaedics and Related Research* 2021 May 1; 479(5):1040-1049. PMC8052006
29. Nestorovski D, Wasko M, Fowler LM, **Harris MD**, Clohisy JC, Nepple JJ: Prominent anterior inferior iliac spine morphologies are common in patients with acetabular dysplasia undergoing periacetabular osteotomy. *Clinical Orthopaedics and Related Research* 2021 May 1; 479(5):991-999. PMC8052058
30. *Song K, Pascual-Garrido C, Clohisy JC, **Harris MD**: Acetabular edge loading during gait is elevated by the anatomical deformities of hip dysplasia. *Frontiers in Sports and Active Living* 2021 Jul 1; 3:687419. PMC8281296
31. ***Harris MD**, Shepherd MC, Song K, Gaffney BMM, Hillen TJ, Harris-Hayes M, Clohisy J: The biomechanical disadvantage of dysplastic hips. *Journal of Orthopaedic Research* 2021 Aug 20; 10:10.1002. PMC8858333
32. *Song K, Pascual-Garrido C, Clohisy JC, **Harris MD**: Elevated loading at the posterior acetabular edge of dysplastic hips during double-legged squat. *Journal of Orthopaedic Research* 2022 Jan 11. doi: 10.1002/jor.25249. PMC9271518
33. *Shepherd MC, Gaffney BMM, Song K, Clohisy JC, Nepple JJ, **Harris MD**: Femoral version deformities alter joint reaction forces in dysplastic hips. *Journal of Biomechanics* 2022. Apr; 135:111023. PMC9064981
34. *Gaffney BMM, Williams ST, Todd JN, Weiss JA, **Harris MD**: A musculoskeletal model for estimating hip contact pressures during walking. *Annals of Biomedical Engineering* 2022. Dec; 50(12):1954-1963. PMC9797423
35. Payne E, **Harris MD**, Harris-Hayes M, Nahal C, Kamenaga T, Clohisy JC, Pascual-Garrido C: Greater Hip Abductor Size in Patients with Pre-Arthritic Developmental Dysplasia of the Hip Compared to those with Pre-Arthritic Femoroacetabular Impingement. *Journal of Orthopaedic Research* 2023. Apr; 41(4):852-861.
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37. *Wu T, Lohse KR, VanDillen L, Song K, Clohisy JC, **Harris MD**: The associations between abnormal muscle biomechanics and poor patient-reported outcomes in patients with hip dysplasia. *Clinical Orthopaedics and Related Research* 2023. Doi 10.1097/CORR.0000000002728.
38. Palaniappan R, **Harris MD**, Steger-May K, Bove AM, Fitzgerald GK, Clohisy JC, Harris-Hayes M: Comparison between movement pattern training and strengthening on kinematics and kinetics in patients with chronic hip-related groin pain. *Journal of Applied Biomechanics* 2022 (in review).
39. Abu-Amer W, Nepple JJ, Hansen E, **Harris MD**, Thapa S, Pascual-Garrido C, Clohisy JC: Femoral version impacts the clinical outcomes of periacetabular osteotomy in patients treated or symptomatic hip dysplasia. *Journal of Arthroplasty* 2023 (in review).
40. *Harris MD, Gaffney BMM, Clohisy JC, Pascual-Garrido C: Femurs in patients with hip dysplasia a have fundamental shape differences compared to cam femoroacetabular impingement. *Journal of Hip Preservation Surgery* 2023 (in review)
41. Vassileva M, Kim JS, Gonzalez Della Valle A, **Harris MD**, Padoia V, Lattenzi R, Byers Krauss V, Pascual-Garrido C, Bostrom MP: AF/HSS Workshop Summary: Hip osteoarthritis is an important distinct research target; Part II – early stage session overview. *HSS Journal* 2023 (in review)

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Peer-reviewed Conference Abstracts and Papers (last 5 years)

1. **Harris MD**, Song K, Davidson BS, Decker MJ, Shelburne KB: The influence of a functional knee brace and orthopaedic tights on lower extremity mechanics during land and cut maneuvers. Orthopaedic Research Society 2017 Annual Meeting, San Diego, CA, March 18-22 (poster #1889).
2. **Harris MD**, Song K, Davidson BS, Decker MJ, Shelburne KB: Multi-joint compensatory maneuvers during landing and cutting at least one year after return to sport following ACL reconstruction. Orthopaedic Research Society 2017 Annual Meeting, San Diego, CA, March 18-22 (poster #0942).
3. Song K, Anderson AE, Weiss JA, **Harris MD**: Musculoskeletal models scaled with CT images versus skin markers in a population with hip deformity compared to controls. 2017 Annual Meeting of the American Society of Biomechanics, Boulder, CO, Aug 8-11 (paper #294).
4. Foster SN, **Harris MD**, Hastings MK, Mueller MJ, Wiseman T, Huber N, Harris-Hayes MJ. Ankle Dorsiflexion and 2D hip, pelvic, and trunk kinematics in patients with chronic hip joint pain during forward step-down. APTA Combined Sections Meeting. New Orleans, LA 2018 (ID 2768586).
5. (spotlight podium talk) Gaffney BMM, Nepple JJ, Clohisy JC, Westen L, **Harris MD**: Statistical shape modeling to quantify variation in femoral geometry in patients with hip dysplasia. Orthopaedic Research Society 2018 Annual Meeting, New Orleans, LA, March 10-13. (Spotlight Session: Hip Disorders).
6. **Harris MD**, Song K, Gaffney BMM: How femoral version changes joint loading in patients with developmental dysplasia of the hip. 2018 Annual Meeting of the American Society of Biomechanics, Rochester, MN, Aug 8-11 (paper #146).

7. Song K, Gaffney BMMG, Pascual-Garrido C, **Harris MD**: Effects of dysplastic pelvis morphology on hip muscle lines of action, moment arm lengths, and contributions to joint reaction forces. 2018 Annual Meeting of the American Society of Biomechanics, Rochester, MN, Aug 8-11 (paper #154).
8. Gaffney BMMG, **Harris MD**: Sensitivity of hip loading to periacetabular osteotomy reorientation. 2018 Annual Meeting of the American Society of Biomechanics, Rochester, MN, Aug 8-11 (paper #123).
9. Song K, Gaffney BMM, **Harris MD**: Hip joint reaction force contributions to acetabular edge loading in dysplastic hips: a subject-specific musculoskeletal modeling study. Orthopaedic Research Society 2019 Annual Meeting, Austin, TX, Feb 2-5 (paper #1930).
10. **(spotlight podium talk) Harris MD**, Gaffney BMM, Clohisy JCC, Pascual-Garrido C: Femoral head shape in developmental dysplasia of the hip has fundamental differences compared to femoroacetabular impingement. Orthopaedic Research Society 2019 Annual Meeting, Austin, TX, Feb 2-5 (Spotlight Session: Pathomechanics of the Hip).
11. Gaffney BMM, Clohisy JCC, **Harris MD**: Differences in sensitivity of hip loading to periacetabular osteotomy across subgroups of hip dysplasia. Orthopaedic Research Society 2019 Annual Meeting, Austin, TX, Feb 2-5 (paper #1899).
12. **(podium talk) Harris MD**, Gaffney BMM, Clohisy JCC, Pascual-Garrido C: Femoral head shape in developmental dysplasia of the hip has fundamental differences compared to femoroacetabular impingement. International Combined Orthopaedic Research Societies 2019 Meeting, Montreal, Quebec, Jun 19-22
13. **Harris MD**, Shepherd MC, Gaffney BMM, Blumkaitis J, Clohisy JC: Altered muscle geometry, moment arms, and strength in patients with hip dysplasia. 2019 Meeting of International Society of Biomechanics. Calgary, Alberta, July 31-Aug 4.
14. **(podium talk) Gaffney BMM, Harris-Hayes M, Clohisy JC, Harris MD**. Effect of simulated hip abductor strengthening on hip loading in hip dysplasia. 2019 Meeting of International Society of Biomechanics. Calgary, Alberta, July 31-Aug 4.
15. Gaffney BMM, Foody J, Clohisy JC, **Harris MD**. Compensations during walking vary across slopes in patients with hip dysplasia. 2019 Meeting of International Society of Biomechanics. Calgary, Alberta, July 31-Aug 4.
16. Song K, Clohisy JC, **Harris MD**. Dysplastic hip anatomy and joint reaction forces affect instantaneous and accumulative loads at the acetabular edge. 2019 Meeting of International Society of Biomechanics. Calgary, Alberta, July 31-Aug 4.
17. **(podium talk) Song K, Clohisy JC, Harris MD**. Effects of periacetabular osteotomy on in-vivo loading at the edge of dysplastic acetabula during gait. Orthopaedic Research Society 2020 Annual Meeting, Phoenix, AZ, Feb 8-11.
18. Gaffney BMM, Song K, Harris-Hayes M, Clohisy JC, **Harris MD**. Influence of hip kinematic perturbations during walking on joint loading in patients with acetabular dysplasia. Orthopaedic Research Society 2020 Annual Meeting, Phoenix, AZ, Feb 8-11. (oral poster – Hip Dysplasia Research Interest Group)

19. Schwabe M, Cheng AL, Pascual-Garrido C, Harris-Hayes M, **Harris MD**, Hunt DM, Prather H, Clohisy JC, Nepple JJ. Hip arthroscopy vs. physical therapy in patients with femoroacetabular impingement: a systematic review and met-analysis of randomized controlled trials. 2020 Pediatric Research in Sports Medicine (PRiSM) 7th Annual Meeting, Glendale, AZ, Jan 23-25.
20. Devries C, Nepple JJ, Fowler LM, Akers S, Pashos G, **Harris MD**, Clohisy JC. Low dose CT scan following periacetabular osteotomy: assessment of reduction and correlation with radiographic measures. 2020 Pediatric Research in Sports Medicine (PRiSM) 7th Annual Meeting, Glendale, AZ, Jan 23-25.
21. (virtual podium talk) Song K, Shepherd MC, Clohisy JC, **Harris MD**. Periacetabular osteotomy for hip dysplasia alters dynamic flexor and abductor moment arms and lines of action. 42nd Annual Meeting of the American Society of Biomechanics, Aug 4-7, 2020
22. Gaffney BMM, Harris-Hayes M, Song K, Clohisy JC, **Harris MD**. Effect of movement training on the location of acetabular loading in developmental dysplasia of the hip. 42nd Annual Meeting of the American Society of Biomechanics, Aug 4-7, 2020 (virtual poster)
23. Haneda M, **Harris MD**, Kucharski A, Kamenaga T, O’Keefe RJ, Clohisy JC, Pascual-Garrido C. Surgically-induced femoroacetabular impingement type deformity in an immature rabbit model. American Society for Sports Medicine annual meeting, 2021.
24. Payne E, Harris MD, Nepple JJ, Clohisy JC, Pasual-Garrido C. Adaptive muscle hypertrophy in hip abductors in the symptomatic dysplastic hip. American Society for Sports Medicine annual meeting, 2021.
25. Pascual-Garrido C, Abu-Amer W, Nepple JJ, Harris MD, Clohisy JC. Does Femoral Version Affect Patient-Reported Outcomes of the Periacetabular Osteotomy for the Treatment of Symptomatic Hip Dysplasia? Pediatric Orthopaedic Society of North America 2021 annual meeting.
26. (podium talk) Song K, Pascual-Garrido C, Clohisy JC, **Harris MD**. Hip dysplasia elevates loading at the posterior acetabular edge during double-legged squat. Orthopaedic Research Society 2021 Annual Meeting, Feb 12-16
27. Shepherd MC, Gaffney BMM, Song K, Clohisy JC, **Harris MD**. The influence of femoral version deformity on joint reaction forces in dysplastic hips. Orthopaedic Research Society 2021 Annual Meeting, Feb 12-16 (virtual poster)
28. Gaffney BMM, Williams ST, Todd JN, Weiss JA, **Harris MD**. Development and validation of an elastic foundation musculoskeletal hip contact model. Orthopaedic Research Society 2021 Annual Meeting, Feb 12-16 (virtual poster)
29. Payne E, Harris MD, Nepple JJ, Clohisy JC, Pasual-Garrido C. Adaptive muscle hypertrophy in hip abductors in the symptomatic dysplastic hip. American Academy of Orthopaedic Surgeons annual meeting, 2021.
30. Haneda M, **Harris MD**, Kucharski A, Kamenaga T, O’Keefe RJ, Clohisy JC, Pascual-Garrido C. Surgically-induced femoroacetabular impingement type deformity in an immature rabbit model. American Academy of Orthopaedic Surgeons annual meeting, 2021.

31. **(virtual podium talk) Harris MD**, Shepherd MC, Song K, Gaffney BMM, Hillen TJ, Clohisy JC. The mechanical disadvantage of dysplastic hips. Orthopaedic Research Society 2021 Annual Meeting, Feb 12-16
32. (virtual podium talk) Shepherd MC, Gaffney BMM, Song K, Clohisy JC, **Harris MD**. The influence of femoral version deformity on joint reaction forces in dysplastic hips. 2021 American Society of Biomechanics Annual Meeting, Aug 9-13. (virtual podium #297)
33. **(podium talk) Harris MD**, Lohse KR, Wu T, Van Dillen LR, Clohisy JC. Associations between abnormal muscle-induced biomechanics and patient-reported outcomes among patients with developmental dysplasia of the hip. Orthopaedic Research Society 2022 Annual Meeting, Tampa, FL, Feb 4-8
34. Shepherd MC, Clohisy JC, Nepple JJ, **Harris MD**. The effect of derotational femoral osteotomy location in dysplastic hips. Orthopaedic Research Society 2022 Annual Meeting, Tampa, FL, Feb 4-8 (poster #1667)
35. Shepherd MC, Clohisy JC, Nepple JJ, **Harris MD**. Simulated derotational femoral osteotomy location in dysplastic hips. 2022 North American Congress of Biomechanics, Ottawa, CA, Aug 21-25 (poster# P1-150)
36. Dy C, Huo R, **Harris MD**, Burke C. 3D motion analysis of shoulder function correlates with patient-reported outcome measures after surgery for traumatic brachial plexus injury. 2023 American Society of Peripheral Nerve annual meeting, Miami, FL, Jan 20-22.
37. Wu T, Lohse KR, Song K, Van Dillen LR, Clohisy JC, **Harris MD**. Abnormal muscle-induced hip biomechanics are associated with poor patient related outcomes in patients with developmental dysplasia of the hip. 2023 APTA Combined Session Meeting, San Diego, CA, Feb 23-25
38. Dy C, Huo R, Beamer Y, Brogan DM, **Harris MD**. 3D motion analysis of shoulder function correlates with patient-reported outcome measures after surgery for traumatic brachial plexus injury. Orthopaedic Research Society 2023 Annual Meeting, Dallas, TX Feb 10-14 (poster #639)
39. Chadderdon A, Shepherd MC, Harris-Hayes M, **Harris MD**. Can instrumented insoles detect hip and knee medial collapse? American Society of Biomechanics 2023 Annual Meeting, Knoxville TN Aug 8-11. (poster #)
40. Bourantas CA, Clohisy, JC, **Harris MD**. Functional coverage following periacetabular osteotomy surgery for dysplastic hips. American Society of Biomechanics 2023 Annual Meeting, Knoxville TN Aug 8-11. (podium)
41. Shepherd MC, **Harris MD**. Kinematics and kinetics during running in dysplastic hips. American Society of Biomechanics 2023 Annual Meeting, Knoxville TN Aug 8-11. (podium)