Brian A. Knarr

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Associate Professor

Department of Biomechanics

Director, [Machining and Prototyping Core](https://www.unomaha.edu/college-of-education/biomechanics-core-facility/service-centers/mapro-core.php)

Co-director, [UNO Sports Medicine and Biomechanics Lab](https://www.unomaha.edu/college-of-education-health-and-human-sciences/sports-medicine-and-biomechanics/index.php)

Co-director, Biomechanics Rehabilitation and Manufacturing Initiative

Assistant Director, Center for Research in Human Movement Variability | [cobre.unomaha.edu](http://cobre.unomaha.edu/)

Biomechanics Research Building | BRB 208

College of Education, Health, and Human Sciences   
University of Nebraska at Omaha | coe.unomaha.edu/brb  
 402.554.4193

EDUCATION

University of Delaware, Newark, DE 2012

**Ph.D. in Biomechanics and Movement Science**

University of Delaware, Newark, DE 2009

**M.S. in Mechanical Engineering**

The College of New Jersey, Ewing, NJ 2006

**B.S. in Mechanical Engineering**

Research and Professional EXPERIENCE

Associate Professor 2021-Present

Department of Biomechanics, University of Nebraska at Omaha

Assistant Professor 2016-2021

Department of Biomechanics, University of Nebraska at Omaha

Associate Scientist 2014-2016

Delaware Rehabilitation Institute, University of Delaware

Research Assistant Professor 2014-2016

Biomedical Engineering, University of Delaware

Biomechanics and Movement Science, University of Delaware

Postdoctoral Researcher 2012-2014

Delaware Rehabilitation Institute, University of Delaware

Research Assistant 2009-2012

Biomechanics and Movement Science, University of Delaware

Research Assistant 2006-2019

Mechanical Engineering, University of Delaware

AWARDS

**Funded Research Support**

**Weitz Innovation and Excellence Fund** 07/2025-06/2026

*Maverick Peak Performance Program*

PI: Wilkins S, Co-PI: **Knarr BA**

Total Award: $130,000

**NIH R15AG085105** 09/2024-08/2027

*Understanding the Neurophysiology of Ankle Instability to Improve Rehabilitation Outcomes*

PI: Rosen A, Co-I: Knarr BK

Total Award:

**NIH R15 AG085105** 09/2024-08-2027

*Understanding the Neurophysiology of Ankle Instability to Improve Rehabilitation Outcomes*

PI:Rosen AB, Co-I: **Knarr BA**

Total Award: $446,072

**Nebraska Research Initiative** 07/2024-06/2025

*Effects of High Intensity Gait Training on gait mobility outcomes in early subacute stroke survivors*

PI: **Knarr BA**

Total Award: $99,998

**Nebraska Research Initiative** 07/2023-06/2025

*Nebraska Healthcare By Design*

PI: Scherr, Co-I: **Knarr BA**

Total Award: $150,000

**Nebraska Research Initiative: Proof of Concept Grant** 04/2023-06/2024

*Development and efficacy of a feedback-driven treadmill*

PI: **Knarr BA**

Total Award: $173,844.00

**IdeA CTR-Pilot** 07/2022-06/2023

*The effects of overground visual biofeedback on walking speed and symmetry in individuals post-stroke*

**PI: Knarr BA**

Total Award: $69,920

**NIH 1R15HD109666** 09/2022-08/2025

*Mechanics of overground, dry, and aquatic treadmill walking in children & adolescents with cerebral palsy*

PI: Kingston, **Co-I: Knarr BA**

Total Award: $448,118

**Nebraska Research Initiative** 07/2022-06/2023

*NRI New Service Grant: Orthotics, Prosthetics, and Exoskeleton Manufacturing*

PI: **Knarr BA**

Total Award: $100,000

**Research Collaborative Initiative** 07/2022 – 06/2023

BIOMECHANICS OF POST-OPERATIVE TREADMILL WALKING REHABILITATION IN CHILDREN WITH CEREBRAL PALSY

PI: Kingston, **Co-I:Knarr BA**

Total Awward: $39,967

**Research Collaborative Initiative** 07/2022-06/2023

*Examining physical activity and weight-related developmental complications in infants at risk for obesity*

PI: Dinkel, **Co-I: Knarr**

Total Award: $39,997

**NU Collaboration Initiative** 08/2021-08/2023

*Optimizing movement and physical activity after anterior cruciate ligament injury*

PI: Wellsandt E, **Co-I: Knarr BA**

Total Award: $150,000

**NASA CAN No. 80MSFC21M0001** 08/2021-08/2022

*Development and Testing of Recyclable and Antimicrobial Materials for Additiive Manufacturing*

PI: Zuniga, Co-I: **Knarr BA**

**$222,000**

**NNH21ZHA004C NASA Established Program to Stimulate Competitive Research (EPSCoR)** 08/2021 – 8/2024

*Development and Testing of Recyclable Antimicrobial Materials for In-Space Manufacturing of Medical Devices*

PI: Zuniga; Co-I: **Knarr BA**

Total Award: $1,125,000

**Great Plains IDeA-CTR Tech Transfer Pilot Grant** 07/2021-06/2023

*Improving and Assessing the validity and reliability of the Ankle-PLAST (Ankle-Portable Laxity and Strength Tester*

National Institutes of Health

PI: Rosen, **Co-I: Knarr BA**

Total Award: $69,916

**Great Plains IDeA-CTR Tech Transfer Pilot Grant** 07/2021-06/2023

*Elimination of Cast Saw Injuries*

PI: Halanski, **Co-I: Knarr BA**

Total Award: $50,000

**University of Nebraska at Omaha Big Idea Initiative** 08/2020-08/2024

*Biomechanics Rehabilitation and Manufacturing Initiative*

**Multiple PI: Knarr BA** and Zuniga J

Total Award: $1,500,000

**NIH INBRE/CTR Collaboration Supplement** 09/2020 – 08/2021

*Wichozani-A Healthy Lifestyle for Rural American Indian Youth through Cultural and Physical Activities: A Community-Based Participatory Research Study*

PI: Smith D

*Subaward* PI: **Knarr BA**

Total Subaward: $55,587

**Nebraska Research Initiative** 07/2021-06/2022

*NRI New Service Grant: Multi-Axis Micromachining Mill and EDM*

PI: **Knarr BA**

Total Award: $170,000

**NIH 1R01-NS114282** 09/2019 – 08/2023

The influence of 3D printed prostheses on neural activation patterns of the primary motor cortex in children with unilateral congenital upper-limb reductions

**Multiple PI:** Zuniga J and **Knarr BA**

Total Award: $1,270,168

**NIH R01-AG056585**

*Movement pattern biofeedback training after total knee arthroplasty*

PI: Stevens-Lapsley J

*Subaward* 05/2019 – 04/2020

PI: **Knarr** BA

Total Award: $22,000

**NIH P20-GM109090 (Phase II)** 09/2019 - 08/2024

*Harnessing Movement Variability to Treat and Prevent Motor Related Disorder*

PI: Stergiou N

Total Award: $10,392,394

*Machining and Prototyping Core*

PI: **Knarr BA**

Total Award: $569,590

**NIH R15-HD094194** 09/2018 – 08/2022

*Impact of assistive device use during treadmill and overground walking post-stroke*

**PI: Knarr BA**

Total Award: $442,693

**Nebraska Research Initiative** 07/2021-06/2022

*NRI New Service Grant: Machining and Prototyping Research Core (MAPRO)*

PI: **Knarr BA**

Total Award: $225,000

**NIH P20-GM109090 (Phase I)** 11/2016 – 04/2019

*Harnessing Movement Variability to Treat and Prevent Motor Related Disorder*

PI: Stergiou

Total Award: $10,088,409

New Investigator Award

*Clinical characterization of movement variability in total knee arthroplasty*

PI: **Knarr BA**  
Total Award: $552,260.10

**Private Funding**01/2017 – 12/2018

*Upper extremity rehabilitation post-stroke using head-mounted virtual reality*

PI: **Knarr BA**

Total Award: $60,000

**IDeA-CTR Pilot Grant** 07/2018 – 06/2019

*Development of a Wearable Intelligent System for Elderly (WISE) with fall risk*

Co-PI: Youn JY, **Knarr BA**

Total Award: $70,140

**NU Collaboration Initiative** 04/2017 -03/2018

*Towards optimal prescription of footwear for enhanced human movement performance*

PI: Takahashi K (Co-Investigator: **Knarr BA**)

Total Award: $4,000

**NU Collaboration Initiative**  04/2017 – 03/2018

*Clinical and Biomechanical Factors in Lower Extremity Osteoarthritis*

PI: Wellsandt E (Co-Investigator: **Knarr BA**)

Total Award: $9,825

Society MEMBERSHIPS

American Society of Biomechanics

American Society of Mechanical Engineers

American Heart Association

Gait and Clinical Movement Analysis Society

Professional Activities

**2018** Reviewer, American Society of Biomechanics Research Travel Grant Awards

**2018** Moderator, Rocky Mountain American Society of Biomechanics

Podium Session: ‘Modeling’

**2015** Reviewer, Biomedical Engineering Society 2015 Annual Meeting, Orthopaedic and Rehabilitation Engineering Abstracts

**2015** Reviewer, Biomedical Engineering Society 2015 Annual Meeting, Undergraduate Research Abstracts

**2015** Award Judge, Center for Biomedical Engineering Research Symposium, University of Delaware

**2013** Session Co-director. Osteoarthritis Research Society International Pre-Symposium. University of Delaware.

**2013** Moderator, Center for Biomedical Engineering Research Symposium, University of Delaware

Mentorship and Service

**Teaching and Education Service**

Chair, Undergraduate Program Committee, Department of Biomechanics, University of Nebraska at Omaha

Member and Chair, Graduate Undergraduate Program Committee, Department of Biomechanics, University of Nebraska at Omaha

Member and Chair, Retention, Promotion and Tenure Committee, Department of Biomechanics, University of Nebraska at Omaha

Member, Doctoral Program Committee, Department of Biomechanics, University of Nebraska at Omaha

Member, University Committee on Athletics, University of Nebraska at Omaha

Faculty Supervisor, Biomechanics United Student Group, Department of Biomechanics, University of Nebraska at Omaha

**Dissertation and Thesis Committees**

**Doctoral Dissertation Chair**

Kim, Namwoong, 2018-2021

Ouattas, Abderrahman, 2019

Hamer, Tyler, 2019-2022

Hedrick, Erica, 2019-2022

Leutzinger, Todd, 2019-2022

Parker, Sheridan, 2020-Present

Steffensen, Emily, 2021-Present

Odanye, Oluwaseye, 2023-Present

**Doctoral Dissertation Committee**

Choi, Jungyeon, 2020-2022

Hulburt, Tessa, 2020-2022

Jorgensen, Alyx, 2020-Present

Rasmussen, Corbin, 2021-Present

Ide, Tomohiro, 2022-Present

Copeland, Chris, 2023-Present

**Master’s Thesis Chair**

Ouattas, Abderrahman, 2016-2018

Nimtz, Katlyn, 2016-2018

Dudley, Drew, 2017-2019

Hamer, Tyler, 2017-2019

Buffum, Russell, 2018-Present

Parker, Sheridan, 2018-2020  
Remski, Lindsey, 2019-2021

Hultine, Shane, 2020-Present

Eggleston, Garrett, 2020-2022

Scott, Angeleau, 2020-2022

Kinney, Taylor, 2020-2022

Servais, Michael, 2020-2022

Odanye, Oluwaseye, 2021-2022

Mingo, Madison, 2021-Present

Matassa, Grace, 2022-Present

Amaechi, Martins, 2022-Present

**Master’s Thesis Committee Member**

Granatowicz, Zachary, 2022-Present

Miyazaki, Ashuhito, 2022-Present

Yoo, Takhyun, 2022-Present

Vogel, Colleen, 2022

Ide, Tomohiro, 2021

Bixler, Kellie, 2021

Janicek, Cheyenne, 2020-2021

Miller, Sarah, 2020-2021

Choe, SeokJae, 2020

Cortez Reyes, Claudia, 2020

Beier, Blake, 2018-2020

Chung, Sunghoon, 2019-2020

Ray, Samuel, 2016-2019

Jang, Jaeho, 2018-2019

Henrickson, Jayson, 2018

**Undergraduate Students**

*Internship Advisor*

Bethany Gatlin, University of Nebraska at Omaha, Spring 2022

Madison Mingo, University of South Dakota, Summer 2020

Lindsey Remski, Grand Valley State University, Spring 2019

Jenna Ackerman, University of Nebraska Kearney, Spring 2019

*Research Advisor*

Dimitri Haan, University of Nebraska at Omaha. Department of Biomechanics, 2021-Present

Abby Meier, University of Nebraska at Omaha. Department of Biomechanics, 2021-Present

Luke Capoun, University of Nebraska at Omaha. Department of Biomechanics, 2020

Luke Partusch, University of Nebraska at Omaha. Department of Biomechanics, 2020-2022

Sadie Limback, University of Nebraska at Omaha. Department of Biomechanics, 2020-2022

Katie Andersen, University of Nebraska at Omaha. Department of Biomechanics, 2019-2022

Breanna Strunc, University of Nebraska at Omaha. Department of Biomechanics, 2019

Jaclyn Taylor, University of Nebraska at Omaha. Department of Biomechanics, 2019

Ben Frazier, University of Nebraska at Omaha. Department of Biomechanics, 2018-2019

Katlyn Guhl, University of Nebraska at Omaha. Department of Biomechanics, 2018-2021

Sydney Andreasen, University of Nebraska at Omaha. Department of Biomechanics, 2018-2022

Monica Barajas, University of Nebraska at Omaha. Health and Kinesiology. 2017-2019.

Matt Harrison, University of Nebraska at Omaha. Department of Neuroscience. 2017.

Russell Buffum, University of Nebraska at Omaha. Department of Mathematics. 2017-2018.

Samantha Sack, University of Nebraska at Omaha. Department of Biomechanics. 2017.

Mason Schleu, University of Nebraska at Lincoln. Computer Science and Engineering. 2016-2018.

Boman Groff, University of Nebraska at Omaha. Department of Neuroscience. 2016-2017.

Connor Reed, University of Nebraska at Omaha. Department of Biomechanics. 2016-2017.

Maria Nicholson, University of Delaware. CBER Summer Undergraduate Research Fellowships 2014, 2015

Gillian McCarren, Towson University. Delaware INBRE Summer Scholars Program. 2015.

William Justice, Delaware State University. Delaware INBRE Summer Scholars Program. 2015.

Michaela Schulman, University of Delaware. Delaware Rehabilitation Institute Summer Scholars. 2015.

Lydia Zakutney, University of Delaware. Biomedical Engineering. 2015

Collin Patterson, University of Delaware. Biomedical Engineering. 2015

Mary Doolin, University of Delaware. Delaware Rehabilitation Institute Summer Scholar 2014.

Victoria Stanhope, University of Delaware. Mechanical Engineering. 2012-13

Laura van der Post, University of Delaware. Mechanical Engineering. 2012-13

*Senior Design.Capstone Advisor*

University of Nebraska at Omaha, 2018-Present

University of Delaware, 2014

Ad HOc Reviewer

**Grant Reviewer**

National Institutes of Health

Study Section, Small Business Grants (Musculoskeletal, Oral, Skin, Rheumatology, Orthopedic, Rehab)

Czech Science Foundation (GACR), Reviewer, EXPRO Project Proposals

**Academic Journals**

Archives of Rehabilitation Research and Clinical Translation

Journal of Biomechanics

Journal of Applied Biomechanics

Electromyography and Kinesiology

Biomedical Engineering Society

PLOS ONE

Gait and Posture

Clinical Biomechanics

**Conferences**

Biomedical Engineering Society, Abstract Reviewer

American Society of Biomechanics, Travel Award Reviewer

**Moderator**

Moderator, Rocky Mountain American Society of Biomechanics, Podium Session: ‘Modeling’

Moderator, Center for Biomedical Engineering Research Symposium, University of Delaware

Media

**UNO MarComm**. 04/08/2025. Is Your Brain Preventing You From Recovering From an Ankle Injury? <https://www.unomaha.edu/news/2025/04/is-your-brain-preventing-you-from-recovering-from-an-ankle-injury.php>

**British Softball Federation**. 02/20/2025. Great Britain Softball Olympic Programme to Partner with UNO Pitching Lab In Collaboration With OGX. <https://www.britishsoftball.org/news/article/great-britain-softball-olympic-programme-to-partner-with-uno-pitching-lab-in-collaboration-with-ogx>

**UNO MarComm**. 05/15/2024. Advancing Stroke Rehabilitation Through VR: UNO's Groundbreaking Research. <https://www.unomaha.edu/news/2024/05/advancing-stroke-rehabilitation-through-vr-unos-ground-breaking-research.php>

**OGX. 02/21/2024.** UNO Softball Pitching Lab is Now Open in Partnership with OGX Softball <https://ogxsoftball.com/uncategorized/for-immediate-release-uno-softball-pitching-lab-is-now-open-in-partnership-with-ogx-softball/>

**WOWT 6 News**. 06/12/2023. UNO Pitching Lab building national rep, CWS following <https://www.wowt.com/2023/06/13/uno-pitching-lab-building-national-rep-cws-following/>

**KETV NewsWatch 7.** 06/22/2022. UNO pitching lab helps athletes improve their pitch. <https://www.youtube.com/watch?v=3gelVOWltuI>

**UneTech Institute. 05/21/2021.** Fabled Self-Pacing Treadmill is Real and it’s in Omaha. <https://www.unetech.org/2021/05/19/fabled-self-pacing-treadmill-is-real-and-its-in-omaha/>

**The Gateway.** 05/04/2021**.** Into the Lab: How a state-of-the-art facility aims at giving Maverick pitchers an edge on the competition. <https://unothegateway.com/into-the-lab-how-a-state-of-the-art-facility-aims-at-giving-maverick-pitchers-an-edge-on-the-competition/>

**Omaha World Herald**. 08/10/2019. With Hollywood motion capture, Omaha researcher creates virtual reality for kids with disabilities. <https://www.omaha.com/livewellnebraska/with-hollywood-motion-capture-omaha-researcher-creates-virtual-reality-for/article_424d3c8d-9046-5f48-8fb8-810d2ca8ec84.html>

**UNO College of Education News**. Biomechanics In Action (Biomechanics-QLI Partnership). <https://www.unomaha.edu/college-of-education/news/2018/11/biomechanics-qli-partnership.php>

**UNO College of Education News**. Biomechanics professor receives nearly $500K from the NIH to study role of assistive devices in stroke recovery. <https://www.unomaha.edu/college-of-education/news/2018/12/knarr-receives-r15.php>

**UDaily** 07/14/2015. *SmartBoot: Engineering students add high-tech function to low-tech orthopedic boot,* by Diane

Kukich. http://www.udel.edu/udaily/2016/jul/smartboot-071415.html

**The O&P EDGE, OANDP.COM.** 07/23/15. *University Students Develop Orthopedic Boot With “Smart” Features.* <http://www.oandp.com/articles/NEWS_2015-07-23_06.asp>

**Tech Times** 07/17/2015. *University Of Delaware Students Design Boot That Helps Heal Broken Bones,* by [J.E. Reich](http://www.techtimes.com/reporters/j-e-reich) http://www.techtimes.com/articles/69836/20150717/university-delaware-students-design-boot-helps-heal-broken-bones.htm

**The Osgood File**. 08/04/15. *A SMARTBOOT TO HEAL INJURED FEET*. [www.theosgoodfile.com](http://www.theosgoodfile.com). Show archive: <http://www.westwood-backup.com/pg/jsp/osgood/transcript.jsp?pid=41273>

**The Philadelphia Inquirer**. Philly.com. 11/08/2015. *High-tech boot could speed healing,* by Tom Avril.<http://articles.philly.com/2015-11-09/news/68110626_1_higginson-patients-sensors>

PUBLICATIONS AND PAPERS

1. Poomulna J, **Knarr BA**, Dutt V, Kingston DC. Comparison of gait deviation index (GDI) and gait variability index (GVI) measured by marker-based and markerless motion capture systems in children with cerebral palsy (CP). Gait & Posture. 2025 Jan 1;115:7-13.
2. Ide T, Hamer TJ, Rosen AB, Vogel C, Haan D, **Knarr BA**, Wilkins SJ. Limited Total Arc Glenohumeral Rotation and Shoulder Biomechanics During Baseball Pitching. Journal of Athletic Training (Allen Press). 2024 Oct 1;59(10).
3. Dinkel D, Rech JP, Chaudhary P, Thelagothoti RK, Youn J, Ali H, Schenkelberg M, **Knarr B**. Methodology for Assessing Infant (0–2 Years) Movement Using Accelerometers: A Scoping Review. Journal for the Measurement of Physical Behaviour. 2024 Sep 3;7(1).
4. Leutzinger TJ, Kingston DC, Dinkel DM, Wellsandt E, **Knarr BA**. Differences in knee joint moments between individuals who are living with obesity and those of a healthy weight when negotiating stairs. The Knee. 2024 Aug 1;49:217-25.
5. Odanye O, Steffensen E, Hinton E, Bierner S, Hsiao HY, **Knarr B**. Treadmill Handrail-Use Increases the Anteroposterior Margin of Stability in Individuals’ Post-Stroke. Journal of Motor Behavior. 2024 May 3;56(3):253-62.
6. Hinton EH, Bierner S, Reisman DS, Likens A, **Knarr BA**. Paretic propulsion changes with handrail Use in individuals post-stroke. Heliyon. 2024 Mar 15;10(5).
7. Ide T, Hamer TJ, Rosen AB, Vogel C, Haan D, **Knarr BA**, Wilkins SJ. Limited total arc range of motion increases sheer stress in the shoulder while pitching in collegiate baseball pitchers. Journal of Athletic Training. 2024 Mar 6.
8. D’Ovidio AJ, **Knarr B**, Blanchard AJ, Bennett GW, Leiva W, Duan B, Zuniga JM. Characterization of antimicrobial poly (lactic acid)-and polyurethane-based materials enduring closed-loop recycling with applications in space. Polymers. 2024 Feb 25;16(5):626.
9. Choi J, **Knarr BA**, Youn JH, Song KY. Machine Learning-Based Approach to Identifying Fall Risk in Seafarers Using Wearable Sensors. Journal of Marine Science and Engineering. 2024 Feb 19;12(2):356.
10. Parker SM, Andreasen SC, Ricks B, Kaipust MS, Zuniga J, **Knarr BA**. Comparison of brain activation and functional outcomes between physical and virtual reality box and block test: a case study. Disability and Rehabilitation: Assistive Technology. 2024 Feb 17;19(2):273-80.
11. Hinton EH, Buffum R, Kingston D, Stergiou N, Kesar T, Bierner S, **Knarr BA**. Real-Time Visual Kinematic Feedback During Overground Walking Improves Gait Biomechanics in Individuals Post-Stroke. Annals of biomedical engineering. 2024 Feb;52(2):355-63.
12. Thelagathoti RK, Chaudhary P, **Knarr B**, Schenkelberg M, Ali HH, Dinkel D. Exploring Infant Physical Activity Using a Population-Based Network Analysis Approach. Analytics. 2023 Dec 31;3(1):14-29.
13. Choi JY, Vogel C, Burcal CJ, Remski LE, **Knarr BA**, Rosen AB. Neurocognitive Hop Performance in Patients With Chronic Ankle Instability. International Journal of Athletic Therapy and Training. 2023 Dec 9;29(2):101-5.
14. Parker SM, Ricks B, Zuniga J, **Knarr BA**. Comparison of virtual reality to physical box and blocks on cortical an neuromuscualar activations in young adults. Scientific Reports. 2023 Oct 2;13(1):16567.
15. Choi JY, Vogel CM, Remski LE, **Knarr BA**, Rosen AB. The Relationship Between Neurocognitive Hop Performance and Self-Reported Ankle Function Among Chronic Ankle Instability Participants, Ankle Sprain Copers and Healthy Controls. Journal of Athletic Training 2023. Vol. 58 (65), No. 6 Supplement, pp. S-96
16. Hinton EH, Buffum R, Stergiou N, Kingston D, Bierner S, **Knarr BA**. A portable visual biofeedback device can accurately measure and improve hip extension angle in individuals post-stroke. Clinical Biomechanics. 2023 May 1;105:105967.
17. Awad LN, **Knarr BA**, Kudzia P, Buchanan TS. The Interplay Between Walking Speed, Economy, and Stability After Stroke. Journal of Neurologic Physical Therapy. 2023 Apr 1;47(2):75-83.
18. Rosen AB, Choi JY, Anderson K, Remski LE, **Knarr BA**. Development, validity, and test-retest reliability of a new neurocognitive functional performance test: The choice-reaction hop mat. Physical Therapy in Sport. 2023; 59:80-84
19. Hinton EH, Likens A, Hsiao HY, Binder-Markey BI, Binder-Macleod SA, **Knarr BA**. Ankle stiffness modulation during different gait speeds in individuals post-stroke. Clinical Biomechanics. 2022; 99:105761
20. Hamer TJ, Rosen AB, Wilkins SJ, Nicholson KF, Bullock GS, **Knarr BA**. A comparison of pitching biomechanics and sport specialization in high school pitchers. International Journal of Sports Physical Therapy. 2022; 17(5):870-875
21. Choi J, **Knarr BA**, Youn JH. The Effects of Ship’s Roll Motion on the Center of Mass and Margin of Stability During Walking: A Simulation Study. IEEE Access. 2022 Sep 22;10:102432-9.
22. Choi J, **Knarr BA**, Gwon Y, Youn JH. Prediction of stability during walking at simulated ship’s rolling motion using accelerometers. Sensors. 2022; 22(14):5416
23. Choi J, Parker SM, **Knarr BA**, Gwon Y, Youn JH. Wearable sensor-based prediction model of timed up and go test in older adults. Sensors. 2021; 21(20):6831.
24. Dudley, DR, **Knarr, BA**, Siu, KC, Peck, J, Ricks, B, Zuniga, JM. Testing of a 3D printed hand exoskeleton for an individual with stroke: A case study. Disability and Rehabilitation: Assistive Technology. 2021; 16(2):209-213
25. Hedrick, EA, Parker, SM, Hsiao, HY, **Knarr, BA**. Mechanisms used to increase propulsive forces on a treadmill in older adults. Journal of Biomechanics. 2021; 115:110139
26. Parker, SM, Crenshaw, J, Hunt, NH, Burcal, C, **Knarr, BA**. Outdoor walking exhibits peak ankle and knee flexion differences compared to fixed and adaptive-speed treadmills in older adults. BioMedical Engineering OnLine. 2021; 20(1):1-15
27. Higginson, CI, Valenti, M, Ibrahim, K, **Knarr, BA**, Ryan, R, Higginson, JS. Neuroticism and extraversion are related to changes in postural stability during anatomically-related cognitive tasks. Journal of Motor Behavior. 2021;:1-9
28. Kim, N, Lee, SY, Lee, SC, Rosen, AB, Grindstaff, TL, **Knarr, BA**. Effect of isolated hip abductor fatigue on single-leg landing mechanics and simulated ACL loading. The Knee. 2021; 31:118-126
29. Rosen, AB, Buffum, R, **Knarr, BA**. Development and Validation of a Leg Press Force Measuring Device to Assess Limb Strength Asymmetry. Athletic Training & Sports Health Care. 2021;
30. Choi, J, Parker, SM, **Knarr, BA**, Gwon, Y, Youn, JH. Wearable sensor-based prediction model of timed up and go test in older adults. Sensors. 2021; 21(20):6831
31. Kim N, Lee SY, Lee SC, Rosen AB, Grindstaff TL, **Knarr BA**. Effect of isolated hip abductor fatigue on single-leg landing mechanics and simulated ACL loading. The Knee. 2021 Aug 1;31:118-26.
32. Andreasen SC, Wright TR, Crenshaw JR, Reisman DS, **Knarr BA**. Relationships of Linear and Non-linear Measurements of Post-stroke Walking Activity and Their Relationship to Weather. Frontiers in Sports and Active Living. 2020 Nov 3;2:157.
33. Youn IH, Leutzinger T, Youn JH, Zeni JA, **Knarr BA**. Self-Reported and Performance-Based Outcome Measures Estimation Using Wearables After Unilateral Total Knee Arthroplasty. Frontiers in Sports and Active Living. 2020;2.
34. Vaz JR, Knarr BA, Stergiou N. Gait complexity is acutely restored in older adults when walking to a fractal-like visual stimulus. Human movement science. 2020 Dec 1;74:102677.
35. Youn IH, Leutzinger T, Youn JH, Zeni JA, **Knarr BA**. Self-Reported and Performance-Based Outcome Measures Estimation Using Wearables After Unilateral Total Knee Arthroplasty. Frontiers in Sports and Active Living. 2020;2.
36. Lanier AS, **Knarr BA**, Stergiou N, Snyder‐Mackler L, Buchanan TS. ACL injury and reconstruction affect control of ground reaction forces produced during a novel task that simulates cutting movements. Journal of Orthopaedic Research®. 2020 Jan 23.
37. McGrath RL, Ziegler ML, Pires-Fernandes M, **Knarr BA**, Higginson JS, Sergi F. The effect of stride length on lower extremity joint kinetics at various gait speeds. PLOS ONE. 2019.
38. Ouattas A, Wellsandt E, Hunt NH, Boese CK, **Knarr BA**. Comparing single and multi-joint methods to detect knee joint proprioception deficits post primary unilateral total knee arthroplasty. Clinical Biomechanics. 2019 Jun 14.
39. Kennedy C, Higginson C, Valenti M, Ibrahim K, **Knarr B**, Ryan R, Higginson J. A-12 Neuroticism and Extraversion are Related to Dual Task Postural Stability in Healthy Young Adults. Archives of Clinical Neuropsychology. 2019 Jul 25;34(6):871.
40. Kempski KM, Ray NT, **Knarr BA**, Higginson JS. Dynamic structure of variability in joint angles and center of mass position during user-driven treadmill walking. Gait & posture. 2019 Jun 1;71:241-4.
41. Jafarnezhadgero AA, Majlesi M, Etemadi H, Hilfiker R, **Knarr BA**, Shad MM. Effect of 16-week corrective training program on three dimensional joint moments of the dominant and non-dominant lower limbs during gait in children with genu varus deformity. Science & Sports. 2020 Feb 1;35(1):44-e1.
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46. Youn I-H, Youn J-H, Zeni J, **Knarr B**. Biomechanical Gait Variable Estimation Using Wearable Sensors after Unilateral Total Knee Arthroplasty. Sensors. 2018;18(5):1577. doi:10.3390/s18051577.
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49. Kempski K, Awad LN, Buchanan TS, Higginson JS, **Knarr BA**. Dynamic structure of lower limb joint angles during walking post-stroke. J Biomech. 2018;68:1-5. doi:10.1016/j.jbiomech.2017.12.019.
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55. **Knarr BA**, Higginson JS. Practical approach to subject-specific estimation of knee joint contact force. *Journal of Biomechanics,* 2015 Aug 20;48(11):2897-902. PMCID: PMC4536092
56. **Knarr BA**, Higginson JS, Zeni JA. Changes in knee contact force with simulated change in body weight. *Computer Methods in Biomechanics and Biomedical Engineering*, 2015 Mar 11:1-4.DOI: 10.1080/10255842.2015.1018193. PMID: 25760517
57. HY Hsiao, **BA Knarr**, JS Higginson, SA Binder-Macleod. The relative contribution of ankle moment and trailing limb angle to propulsive force during gait. *Human Movement Science*, 2015 Feb;39:212-21 PMID: 25498289 PMCID: PMC4272868
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63. **Knarr BA**, Kesar TM, Reisman DS, Binder-Macleod SA, Higginson JS. Changes in activation and function of the ankle plantarflexor muscles due to gait retraining in chronic stroke survivors. *Journal of* *NeuroEngineering and Rehabilitation*, 2013 Jan 31;10:12. . PMID: 23369530 PMCID: PMC3565909
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66. Sions M, Malecka C, **Knarr BA**, Jancosko A, Binder-Macleod SA. Age- and Stroke-Related Skeletal Muscle Changes: A Review for the Geriatric Clinician. *Journal of Geriatric Physical Therapy*, 2012 Jul-Sep;35(3):155-61. PMID: 22107952 PMCID: PMC3290755
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invited Seminars

1. **Knarr BA**, Kingston DC. Cerebral Palsy Gait Rehabiliation. UNMC Physical Medicine and Rehabilitation. Omaha, NE, October, 2024.
2. **Knarr BA**. Biomechanics Research and Resources for Improving Rehabiliation. Quality Living, Inc. Omaha, NE, January 2023.
3. **Knarr BA**. Advancing Stroke Rehabilitation Through Novel Devices and Interventions. UNMC Physical Medicine and Rehabilitation. Omaha, NE, April, 2022.
4. **Knarr BA**. Applying Research Across Populations: How Stroke And Total Knee Replacement Are The Same, Yet Different. The Department of Biomechanics and the Center for Research in Human Movement Variability Seminar Series. Omaha, NE, April 20, 2017.
5. **Knarr BA**. Informing Rehabilitation Through Musculoskeletal Modeling. Opportunities for Collaboration between Engineering & Medicine in M&S. 16th Annual IEEE International Conference on Electro Information Technology. Lincoln, NE, 2017
6. **Knarr BA**. Closing the Loop: Translating Rehabilitation into the Clinic. Center for Research in Human Movement Variability Seminar Series, University of Nebraska at Omaha, March 2016.
7. Higginson JS, **Knarr BA**. Subject-specific Parameters and the Prediction of Knee Joint Contact Force Using Musculoskeletal Modeling. World Congress of Biomechanics, Boston, Massachusetts, July 2014.
8. Higginson JS, **Knarr BA**, Ramsay J. Measuring and Incorporating Subject-Specific Muscle Parameters in Post-Stroke Gait Simulations. OpenSim Webinar Series, Stanford University, September 17, 2013.
9. Manal K, **Knarr BA**. Gait Analysis and Knee Contact Force Modeling. Osteoarthritis Research Society International Pre-Symposium, University of Delaware, April 17, 2013.
10. **Knarr BA.** Research Applications Using Multi-Body Dynamic Musculoskeletal Models. Biomechanics and Movement Science Seminar Series, University of Delaware, April 19, 2013.

National and INternational Conference Abstracts

1. Steffensen EA, Sommerfeld JH, Likens AD, **Knarr BA**. Self-selected handrail use reduces complexity of lower limb joint movements during treadmill gait in chronic stroke survivors. American Society of Biomechanics Conference, August 2023, Knoxville, TN, USA
2. Steffensen E, Hinton EH, Odanye O, Remski L, Bierner S, **Knarr BA**. THE EFFECTS OF CANE SUPPORT ON FRONTAL PLANE HIP KINETICS AND KINEMATICS IN CHRONIC STROKE. North American Congress on Biomechanics. August 2022. Ottawa, Canada.
3. Parker SM, Lacey B, Ricks B, Zuniga J, **Knarr BA**. Use of Virtual Reality in Assessing Neural Outcomes in Healthy Adults. North American Congress on Biomechanics. August 2022. Ottawa, Canada.
4. Hinton EH, Steffensen E, Bierner S, Kingston D, Stergiou N, Kesar T, **Knarr BA**. Visual Biofeedback During Overground Walking Increases Walking Speed in Individuals Post-Stroke. North American Congress on Biomechanics. August 2022. Ottawa, Canada.
5. Odanye OP, Steffensen EA, Hinton EH, Bierner S, Hsiao HY, **Knarr BA**. TREADMILL HANDRAIL USE INCREASES PARETIC SIDE MARGIN OF STABILITY IN INDIVIDUAL’S POST-STROKE. North American Congress on Biomechanics. August 2022. Ottawa, Canada.
6. Hamer T, Rosen A, Wilkins S, **Knarr BA**. Implementation and Evaluation of a Baseball Pitching Program and Its Impact on Pitching Biomechanics. North American Congress on Biomechanics. August 2022. Ottawa, Canada.
7. Hinton EH, Bierner S, Kingston D, Stergiou N, Kesar T, **Knarr BA**. Real-Time Biofeedback Increases Hip Extension Angle in Individuals Post-Stroke. Gait and Clinical Movement Analysis Society. June 2022.
8. Rosen AB, Choi JY, Anderson K, Remski LE, **Knarr BA**. Validity and Test-Retest Reliability of a New Neurocognitive Functional Performance Test: The Choice-Reaction Hop Test. Presented at the World Federation of Athletic Training and Therapy (WFATT). Winnipeg, Canada. May 2022.
9. Parker SM, Buckley E, Coulter K, Ricks B, Zuniga J, **Knarr BA**. Use of Immersive Virtual Reality for Assessing Gross Hand Dexterity. Neuroscience 2021, November 2021.
10. Hedrick EA, Buffum R, Reisman DS, Bierner S, **Knarr BA**. Functional Level Impacts the Use of Assistive Devices for Individuals Post-Stroke. American Society of Biomechanics. August 2021.
11. Leutzinger T, Christensen J, Christiansen C, Knarr BA, Stevens-Lapsley J. Subject Specific Strength and Knee Alignment Angles to Improve Knee Joint contact Force Predictions In An Individual Post Total Knee Arthroplasty. American Physical Therapy Association Combined Sections Meeting. February 2021.
12. Kim N, Leutzinger T, **Knarr BA**. Muscle Contributions to Knee Joint Reaction Forces and Moments during Single-leg Landing. American Society of Biomechanics, August 2020.
13. Hedrick, EA, Buffum R, Reisman DS, Bierner S, **Knarr BA**. Functional level Alters the Impact of Assistive Device Use on Propulsive Impulse Post-Stroke. American Society of Biomechanics, August 2020.
14. Parker S, Hedrick E, **Knarr BA**. Kinematic Response to Adaptive Speed Treadmill versus Fixed Speed Treadmill Walking in Older Adults. American Society of Biomechanics, August 2020.
15. Leutzinger TJ, Hedrick E, **Knarr BA**. Walking with a Cane Alters Plantar flexor Muscle Forces During Walking In An Individual Post-stroke. American Society of Biomechanics, August 2020.
16. Remski L, Buffum R, Lanier AS, Rosen AB, **Knarr BA**. Use of Nonlinear Dynamics to Characterize Force Control during Leg Press Exercise. American Society of Biomechanics, August 2020.
17. Hedrick, EA, Buffum R, Reisman DS, Bierner S, **Knarr BA**. The Interaction of Propulsive Assistive Device to Propulsive Limb Forces During Walking Post-Stroke. Biomedical Engineering Society 2020
18. Parker S, Leutzinger T, Lacy B, Ricks B, Zuniga J, **Knarr B**. Use Of Virtual Reality For Assessing Gross Hand Dexterity In Young Healthy Individuals. Summer Biomechanics, Bioengineering, and Biotransport Conference 2020.
19. Choi J, Ouattas A, Parker S, Youn J, **Knarr B.** Elderly’s Walking Classification between Indoors and Outdoors using Deep Neural Networks. Biomedical Engineering Society. October 2019. Philadelphia, PA.
20. Kim N and **Knarr BA**. Influence of Hip Abductor Fatigue on ACL Loading during Single-leg Landing. International Society of Biomechanics and American Society of Biomechanics, August 2019. Calgary, Canada.
21. Ouattas A, Parker S, Youn J, **Knarr B**. Are the outside stability measures as sensitive as the inside measures? American Society of Biomechanics & International Society of Biomechanics combined annual meeting, August 2019, Calgary, Alberta, Canada.
22. Parker S, Ouattas A, Youn JH, **Knarr BA**. Comparison of Nonlinear Lower Limb Joint Variability using IMU and Motion Capture Based Kinematics. International Society of Biomechanics/American Society of Biomechanics. July 31- August 4, 2019. Calgary, Canada.
23. Hamer T, Ouattas A, Nimtz K, Boese K, **Knarr BA**. Relationships Between Joint Angle Variability Across Terrains and Knee Arthroplasty Satisfaction. International Society of Biomechanics (ISB), August 2019. Calgary, Alberta, Canada.
24. Silva L, Likens AD, Rowen D, Vaz JR, **Knarr B**, Stergiou N. Synchronization between Stride Time Intervals and External Visual Cueing. International Society of Biomechanics/American Society of Biomechanics. July 31- August 4, 2019. Calgary, Canada.
25. Silva L, Likens AD, Rowen D, Vaz JR, **Knarr B**, Stergiou N. Multifractal Analysis of Visually Cued Stride Intervals International Society of Biomechanics/American Society of Biomechanics. July 31- August 4, 2019. Calgary, Canada.
26. Rosen AB, Buffum R, **Knarr B**. Validation of a Leg Press Force Measuring Device to Assess Limb Strength Asymmetry. World Federation of Athletic Training & Therapy, May 2019. Tokyo, Japan.
27. Kempski K, **Knarr BA**, Higginson JS. Dynamic Structure of Variability of Joint Angles on Split-Belt User-Driven Treadmill. Biomedical Engineering Society, October 2018. Atlanta, Georgia.
28. Hamer T, Ouattas A, Nimtz K, **Knarr BA**. Examining the minute-to-minute predictability of walking distance and local joint stability across multiple surfaces. American Society of Biomechanics, August 2018. Rochester, Minnesota.
29. Rowen DA, Vaz JR, **Knarr BA**, Stergiou N. Walking with Visual Cueing Affects Cortical Hemodynamics. American Society of Biomechanics, August 2018. Rochester, Minnesota.
30. Kempski KM, **Knarr BA**, Higginson JS. Propulsive and Braking Impulse with Induced Asymmetric Gait and User-Driven Treadmill Control. American Society of Biomechanics, August 2018. Rochester, Minnesota.
31. Awad L, **Knarr BA**, Kudzia P, Buchanan TS. Speed-based Changes to Walking Stability and Economy May Explain Preferred Walking Speed after Stroke. 2018 World Congress of Biomechanics, July 2018. Dublin, Ireland.
32. Ray NT, **Knarr BA**, Higginson JS. Response of Stroke Survivors to Novel User-Driven Treadmill Control. 2018 World Congress of Biomechanics, July 2018. Dublin, Ireland.
33. Ray NT, **Knarr BA**, Higginson JS. Generating Forward Propulsion during User-Driven and Fixed Speed Treadmill Walking. 2018 World Congress of Biomechanics. July 2018. Dublin, Ireland.
34. Young E, Clowers A, Ricks B, **Knarr BA**, Dexter B. Novel Clinical Application of Virtual Reality Technology through Community Partnerships. Rehabilitation Engineering and Assistive Technology Society of North America Annual Conference. Arlington, VA. July 2018.
35. Ouattas A, **Knarr BA**. Knee Proprioception Impairments and its Effect on Balance Post Total Knee Arthroplasty. Progress in Clinical Motor Control I: Neurorehabilitation. July 2018. State College, PA.
36. Grindstaff TL, Chaput M, Farmer B, Anderson K, Lanier AS, **Knarr BA**, Wichman C, Turman KA. Symmetrical Knee Joint Stride-to-Stride Variability During Running Predicts Patient Function Following Anterior Cruciate Ligament Reconstruction. NATA 69th Clinical Symposia & AT Expo. June 2018. New Orleans, LA.
37. Grindstaff TL, Chaput M, Farmer B, Anderson K, Lanier AS, **Knarr BA**, Wichman C, Turman KA. Decreased gait variability following anterior cruciate ligament reconstruction negatively impacts patient function. American College of Sports Medicine 65th Annual Meeting. June 2018. Minneapolis, MN.
38. Youn IH, Zeni JA, Youn JH, **Knarr BA**. Self-report and Performance Measure Outcome Estimation Using Wearables after Total Knee Arthroplasty. American Society of Biomechanics, August 2017. Boulder, CO.
39. Youn IH, Zeni JA, Youn JH, **Knarr BA**. Biomechanical Gait Variable Estimation Using Wearables after Total Knee Arthroplasty. American Society of Biomechanics, August 2017. Boulder, CO.
40. Ouattas A, Ray NT, Zeni JA, **Knarr BA**. Spatial-Temporal Measurements Indicate Knee Loading Asymmetry After Total Knee Arthroplasty. American Society of Biomechanics, August 2017. Boulder, CO.
41. Ray NT, **Knarr BA**, Higginson JS. Contributions to Increased Walking Speed During Fixed and User-Driven Treadmill Walking. American Society of Biomechanics, August 2017. Boulder, CO.
42. Groff B, Antonellis P, **Knarr BA**, Stergiou N. Movement Variability and Sensorimotor Cortical Activation During Forward and Backward Walking. American Society of Biomechanics, August 2017. Boulder, CO.
43. Ray NT, **Knarr BA**, Higginson JS. Walking Speed Changes in Response to User-Driven Treadmill Control. Summer Biomechanics, Bioengineering and Biotransport Conference. June 2017. Tucson, AZ.
44. Youn IH, Youn JH, Siu KC, **Knarr BA**, Choi J. Wearable sensor-based 48-Hour activity and gait monitoring in the acute care setting. International Conference on Ambulatory Monitoring of Physical Activity and Movement, June 2017. Bethesda, MD.
45. Ray NT, Marmon AR, Zeni JA, **Knarr BA**. Detection of Loading Asymmetry after TKA using Tibial Acceleration. American Society of Biomechanics Conference, August 2016. Raleigh, NC.
46. Richardson RT, Quinton R, **Knarr BA**, Russo S, Higginson JS, Richards R. A comparison of model-predicted muscle activations with electromyography during shoulder abduction. American Society of Biomechanics Conference, August 2016. Raleigh, NC.
47. Richardson RT, **Knarr BA**, Higginson JS, Richards JG. Glenohumeral abduction and flexion moment arms: a verification study of a new musculoskeletal model of the shoulder. American Society of Biomechanics Conference, August 2015. Columbus, OH.
48. West TK, Schenk ME, Schnall DA, O’Brien ME, Groome MA, Singh A, Higginson JS, **Knarr BA**. SmartBoot: An Instrumented Clinical Walking Boot for Partial Weight Bearing Training. Summer Biomechanics, Bioengineering and Biotransport Conference, June 2015, Snowbird Resort, Utah. ***(3rd Place, Undergraduate Design Competition).***
49. Doolin M, Higginson JS, **Knarr BA**. Evaluation of multiple training paradigms when using biofeedback for learning partial weight bearing. Gait and Clinical Movement Society, March 2015, Portland, Oregon.
50. Richardson RT, **Knarr BA**, Higginson JS, Richards JG. Evaluation of glenohumeral muscle moment arms of a new musculoskeletal model of the shoulder and upper extremity. Gait & Clinical Movement Analysis Society. March 2015. Portland, OR.
51. **Knarr BA**, Awad L, Reisman DS. Training with Real-Time Visual Feedback of Propulsive Force in Post-Stroke Individuals: A Case Study. Gait and Clinical Movement Society, June 2014, Newark, DE.
52. Eitzen I, Kallerud H, Fernandes L, Nordsletten L, **Knarr BA**, Risberg M. Gait, Symptoms and Function in Patients with Mild to Moderate Hip Osteoarthritis: 6-7 Year Follow-up. OARSI World Congress on Osteoarthritis. April 2014. Paris, France.
53. Brandis C, Awad LN, Hsiao H, Marion MS, Kesar TM, **Knarr BA**, Higginson JS, Binder-Macleod SA. The Effects of Fatigue on Post-Stroke Muscle Force Production and Center of Mass Acceleration: A Musculoskeletal Simulation Analysis. Computer Methods in Biomechanics and Biomedical Engineering. April 2013, Salt Lake City, Utah.
54. **Knarr BA**, Reisman DS, Binder-Macleod SA, Higginson JS. Changes in Model-Predicted Muscle Activation with Subject Specific Parameters for Individuals Post-Stroke. Computer Methods in Biomechanics and Biomedical Engineering. April 2013, Salt Lake City, Utah.
55. **Knarr BA**, Higginson JS. The Ability of a Residual Reduction Algorithm to Account for Handrail Use During Gait Analysis. American Society of Mechanical Engineering Summer Bioengineering Conference, June 2012, Fajardo, Puerto Rico.
56. **Knarr BA**, Ramsay J, Buchanan TS, Binder-Macleod SA, Higginson JS. Quantification of atrophy and activation failure in the plantar flexors post-stroke. American Society for Biomechanics Meeting, August 2011, Long Beach, CA.
57. **Knarr BA**, Kesar TM, Helm E, Reisman DS, Binder-Macleod, SA, Higginson, JS. Simulation detects changes in muscle activation in post-stroke gait after a functional electrical stimulation intervention. American Society for Biomechanics Meeting, August 2010, RI.
58. **Knarr BA**, Zeni J, Higginson JS. Comparison of Electromyography and Joint Moment as Indicators of Co-contraction. Gait and Clinical Movement Society, May 2010, Miami, FL.
59. **Knarr BA**, Higginson JS. Muscle compensation strategies with plantar flexor and dorsiflexor activation impairment. Gait and Clinical Movement Society, May 2010, Miami, FL.
60. **Knarr BA**, Novotny JE. Protective Strategies Revealed from Stress Distributions in Subject-Specific Finite Element Models of Skeletal Muscle. Orthopaedic Research Society, February 2009, Las Vegas, NV.
61. Novotny JE, **Knarr BA**, Zhou H. Maximum contractile strain in the biceps brachii is bounded by sarcomere geometry. Summer Bioengineering Conference 2008, ASME. Marco Island, FL, USA
62. Novotny JE, **Knarr BA**, Zhou H. Biceps Brachii Muscle Strains Show Simultaneous Concentric, Eccentric, and Isometric Behavior during Elbow Flexion-Extension. The Orthopaedic Research Society meeting, 2008 Transactions Vol.33, San Francisco, CA/
63. Novotny JE, **Knarr BA**, Zhou H. Observing strain distributions in skeletal muscle with CPC-MRI. Biomedical Engineering Society Annual Fall Meeting 2007, Los Angeles, CA, USA
64. Novotny JE, **Knarr BA**, Zhou H. Strains in the biceps brachii during dynamic elbow flexion show concentric, eccentric and isometric behavior simultaneously. American Society for Biomechanics Meeting, August 2007, Palo Alto, CA.

Regional Research Conferences

1. Kempski KM, **Knarr BA**, Higginson JS. Propulsive and Braking Impulse with Induced Asymmetric Gait & User-Driven Treadmill Control. American Society of Biomechanics East Coast Conference. April 2018. Reading, PA. ***(Winner: Best Undergraduate Poster Award)***
2. Ray NT, **Knarr BA**, Higginson JS. Generating Forward Propulsion during User-Driven and Fixed Speed Treadmill Walking. American Society of Biomechanics East Coast Conference. April 2018. Reading, PA.
3. Nimtz K, Ouattas A, **Knarr BA**.Linear and Nonlinear Analysis on Activity Data Relationships to Clinical Measures in Older Adults.Rocky Mountain American Society of Biomechanics, April 2018. Estes Park, CO.
4. Hamer T, Ouattas A, Nimtz K, **Knarr BA**. Examining the minute-to-minute predictability of walking distance across multiple terrains. Rocky Mountain American Society of Biomechanics, April 2018. Estes Park, CO.
5. Nimtz K, Ray NT, Zeni, JA, **Knarr BA**. Differences in correlation between variability of knee kinematics and clinical outcome measures in post-TKA patients. Rocky Mountain American Society of Biomechanics, April 2017. Estes Park, CO.
6. Ouattas A, **Knarr BA**, Majed L. Comparison of static and dynamic linear accuracy between the ‘Precision Position Tracking’ and Vicon motion capture systems: A validation study. Rocky Mountain American Society of Biomechanics, April 2017. Estes Park, CO.

University Research Conferences

1. Kinney T, Hamer T, Richardson R, Wilkins S, Zuniga J, **Knarr BA**. THE IMPACT OF SPORT SPECIALIZATION IN BASEBALL ON SCAPULAR KINEMATICS. Human Movement Variability Conference/Great Plains American Society of Biomechanics. May 2022. Omaha, Nebraska.
2. Steffensen E, Hinton EH, Odanye O, Remski L, Bierner S, **Knarr BA**. THE EFFECTS OF CANE USE ON FRONTAL PLANE HIP BIOMECHANICS IN CHRONIC STROKE GAIT. Human Movement Variability Conference/Great Plains American Society of Biomechanics. May 2022. Omaha, Nebraska.
3. Parker SM, Lacey B, Ricks B, Zuniga J, **Knarr BA**. Assessing Motor Cortex Activation During a Manual and Virtual Reality Box and Block Test. Human Movement Variability Conference/Great Plains American Society of Biomechanics. May 2022. Omaha, Nebraska.
4. Hinton EH, Bierner S, Kingston D, Stergiou N, Kesar T, **Knarr BA**. Improving Paretic Gait Mechanics Using Visual Overground Biofeedback. Human Movement Variability Conference/Great Plains American Society of Biomechanics. May 2022. Omaha, Nebraska.
5. Odanye OP, Steffensen EA, Hinton EH, Bierner S, Hsiao HY, **Knarr BA**. HOW TREADMILL HANDRAIL USE IMPACTS MECHANICAL GAIT STABILITY IN STROKE SURVIVORS. Human Movement Variability Conference/Great Plains American Society of Biomechanics. May 2022. Omaha, Nebraska.
6. Remski L, Kingston D, **Knarr BA**. Usability of a Feedback-Controlled Treadmill in Healthy Adults: A Pilot Study. Human Movement Variability Conference/Great Plains American Society of Biomechanics. May 2022. Omaha, Nebraska.
7. Hamer T, Rosen A, Wilkins S, **Knarr BA**. Biomechanics-Based Baseball Pitching Program and Its Impact on Lower-Extremity Biomechanics. Human Movement Variability Conference/Great Plains American Society of Biomechanics. May 2022. Omaha, Nebraska.
8. Eggleston G, Servais M, Partusch L, Kingston D, **Knarr BA**. The effect of external cues on lower back pain during the golf swing. Human Movement Variability Conference/Great Plains American Society of Biomechanics. May 2022. Omaha, Nebraska.
9. Kinney T, Hamer T, Richardson R, Wilkins S, Zuniga J, **Knarr BA**. The Relationship Between Scapular Orientation and Ball Velocity or Shoulder Kinetics. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
10. Steffensen E, Hinton EH, Odanye O, Remski L, Bierner S, **Knarr BA**. The effects of cane support on frontal plane hip kinetics and kinematics in chronic stroke gait. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
11. Parker SM, Lacey B, Ricks B, Zuniga J, **Knarr BA**. Similar Motor Cortex Activation Exhibited with Virtual Reality Use in Healthy Adults. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
12. Hinton EH, Buffum R, **Knarr BA**. Increasing walking speed in individuals post-stroke using real-time overground visual biofeedback. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
13. Odanye OP, Steffensen EA, Hinton EH, Bierner S, Hsiao HY, **Knarr BA**. Treadmill handrail use can improve gait stability in post-stroke persons. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
14. Andreasen SC, Kaipust MS, **Knarr BA**. Developing an Immersive Environment for Visual Scanning Assessment and Training of Unilateral Spatial Neglect. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
15. Limback S, Remski L, **Knarr BA**. The Effects of Various Volleyball Set Locations on Landing Biomechanics and Anterior Cruciate Ligament Injury. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
16. Hamer T, Rosen A, Wilkins S, **Knarr BA**. Implementation and Evaluation of a Baseball Pitching Program and Its Impact on Pitching Biomechanics. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
17. Eggleston G, Servais M, Partusch L, Kingston D, **Knarr BA**. The effect of external cues on lower back pain during the golf swing. Student Research and Creative Activity Fair. March 2022. Omaha, Nebraska.
18. Remski L, Lanier AS, Stergiou N, Buchanan TS**, Knarr BA**. ACL reconstruction restores knee flexion angle variability but not shear force control variability: a preliminary study. Human Movement Variability Conference/ Great Plains American Society of Biomechanics. May 2021. Omaha, Nebraska.
19. Hedrick EA, Hsiao HY, Binder-Markey BI, Binder-Macleod SA, **Knarr BA**. Ankle Stiffness Modulation During Different Gait Speeds in Individuals Post-Stroke. Human Movement Variability Conference/ Great Plains American Society of Biomechanics. May 2021. Omaha, Nebraska.
20. Parker SM, Andreasen S, Zuniga J, Ricks B, Kaipust M, **Knarr BA**. Improved functional outcome and decreased brain activation following virtual reality training: A case study. Human Movement Variability Conference/ Great Plains American Society of Biomechanics. May 2021. Omaha, Nebraska.
21. Hamer TJ, Rosen AB, Wilkins SJ, **Knarr BA**. Implementation and Evaluation of a Baseball Pitching Program and Its Impact on Injury Prevention and Performance. Human Movement Variability Conference/ Great Plains American Society of Biomechanics. May 2021. Omaha, Nebraska.
22. Andreasen S, Kaipust MS, **Knarr BA**. Validation of Virtual Reality Prism Adaptation for Unilateral Spatial Neglect Intervention. Human Movement Variability Conference/ Great Plains American Society of Biomechanics. May 2021. Omaha, Nebraska.
23. Leutzinger T, Kingston D, Dinkel D, **Knarr BA**. The Effect of Handrail Use on Knee Joint Kinetics When Negotiating Stairs. Human Movement Variability Conference/ Great Plains American Society of Biomechanics. May 2021. Omaha, Nebraska.
24. Guhl K, Remski L, Rosen AB, **Knarr BA**. Risk Factor Assessment for ACL Injuries in D1 Soccer and Volleyball Athletes. Student Research and Creative Activity Fair. March 2021. Omaha, Nebraska.
25. Remski L, Lanier AS, Stergiou N, Buchanan TS, **Knarr BA**. Differences in Knee Angle Variability and Shear Force Control Variability After ACL Injury and Reconstruction. Student Research and Creative Activity Fair. March 2021. Omaha, Nebraska.
26. Hamer TJ, Rosen AB, Wilkins SJ, **Knarr BA**. Implementation and Evaluation of a Baseball Pitching Program and Its Impact on Injury Prevention and Performance. Student Research and Creative Activity Fair. March 2021. Omaha, Nebraska.
27. Hedrick EA, Buffum R, **Knarr BA**. Using Real-Time Biofeedback to Increase Walking Speed in Individuals After Stroke. Student Research and Creative Activity Fair. March 2021. Omaha, Nebraska.
28. Andreasen S, Kaipust M**, Knarr BA**. Simulating Prism Adaptation in Virtual Reality to Determine Efficacy for Future Use. Student Research and Creative Activity Fair. March 2021. Omaha, Nebraska.
29. Remski L, Buffum R, Lanier AS, Rosen A, **Knarr BA**. Force production variability during leg press in healthy individuals. Human Movement Variability Conference, May 2020. Omaha, Nebraska.
30. Andreasen SC, Wright T, Crenshaw JR, Reisman DS, **Knarr BA**. The effect of weather on linear and nonlinear measures of activity in stroke survivors. Student Research and Creative Activity Fair, March 2020. Omaha, Nebraska.
31. Andreasen S, Wright T, Crenshaw J, Reisman D, **Knarr B**. The effect of season and precipitation on physical activity amount, structure, and complexity in stroke survivors. Human Movement Variability Conference and Great Plains Biomechanics Conference, September 2020. Omaha, Nebraska.
32. Parker SM, Hedrick E, Andreasen S, **Knarr BA**. Response of medio-lateral center of mass variability between laboratory and outdoor walking environments. Human Movement Variability Conference, September 2020. Omaha, Nebraska
33. Hedrick, EA, Buffum, R, Reisman, DS, Bierner, S, **Knarr, BA**. Assistive Device Use Affects Peak Propulsive Forces in Individuals Post-Stroke. Human Movement Variability Conference and Great Plains Biomechanics Conference, September 2020, Omaha, Nebraska
34. Hedrick, EA, Buffum, R, Reisman, DS, Bierner, S, **Knarr, BA**. The utilization of assistive devices during walking post-stroke impacts propulsive forces. Student Research and Creative Activity Fair, March 2020, University of Nebraska at Omaha, Omaha, Nebraska
35. Leutzinger T, Christensen J, Christiansen C, **Knarr B**, Stevens-Lapsley J. Subject-Specific Strength And Knee Alignment Angle To Improve Knee Joint Contact Force Predictions In Individuals Post Total Knee Arthroplasty. Research and Creative Activities Fair, March 2020. Omaha, Nebraska.
36. Leutzinger T, Christensen J, Christiansen C, **Knarr B**, Stevens-Lapsley J. Subject-Specific Strength And Knee Alignment Angle To Improve Knee Joint Contact Force Predictions In Individuals Post Total Knee Arthroplasty. Human Movement Variability Conference, September 2020. Omaha, Nebraska.
37. Kim N and **Knarr BA**. Effect of Isolated Hip abductor Fatigue on Single-leg Landing Mechanics and Simulated ACL Loading. Student Research and Creative Activity Fair, March 2020. Omaha, Nebraska.
38. Ackerman J, Remski L, Buffum R, Ouattas A, **Knarr BA**. Effect of handrail strategies on ground reaction forces during stair climbing: a pilot study. Student Research and Creative Activity Fair, March 2019. Omaha, Nebraska.
39. Remski L, Buffum R, Lanier AS, Rosen A, Knarr BA. Force production variability during leg press in healthy individuals. Human Movement Variability Conference, May 2020. Omaha, Nebraska.
40. Hamer TJ, Rosen AB, Knarr BA. Development of a Comprehensive Evaluation to Assess Injury Risk in Collegiate Baseball Pitchers. Human Movement Variability Conference, September 2020. Omaha, Nebraska.
41. Kim N and **Knarr BA**. Influence of Hip Abductor Fatigue on ACL Loading during Single-leg Landing. Human Movement Variability Conference, May 2019. Omaha, Nebraska.
42. Buffum R, Rosen A, **Knarr BA**. Evaluation of leg press instrumentation. Human Movement Variability Conference, May 2019. Omaha, Nebraska.
43. Kim N and **Knarr BA**. Influence of Hip Abductor Fatigue on ACL Loading during Single-leg Landing. Student Research and Creative Activity Fair, March 2019. Omaha, Nebraska.
44. Ouattas A, Parker S, Youn J, **Knarr B**. Stability Measures to Compare Fallers and Non-Fallers During Locomotion. Fourth Annual Human Movement Variability Conference, May 2019, Omaha, NE, USA.
45. Ouattas A, Parker S, Youn J, **Knarr B**. Stability Measures to Compare Fallers and Non-Fallers During Locomotion. Research and Creative Activity Fair, March 2019, Omaha, NE, USA.
46. Parker S, Ouattas A, **Knarr BA**. Reliability of IMU system Compared to Motion Capture. Human Movement Variability Conference. May 2019. Omaha, Nebraska.
47. Parker S, Ouattas A, Youn JH, **Knarr BA**. IMU to Motion Capture Based Nonlinear Limb Joint Variability Based Kinematics Comparison. Research and Creative Activity Fair. March 2019. Omaha, Nebraska.
48. Hamer T, Ouattas A, Nimtz K, Boese K, **Knarr BA**. The Effects of Aging and Knee Arthroplasty on Joint Angle Variability Across Terrains. Office of Research and Creative Activity (ORCA) Fair, March 2019. Omaha, NE.
49. Hamer T, Ouattas A, Nimtz K, Boese K, **Knarr BA**. The Effects of Aging and Knee Arthroplasty on Joint Angle Variability Across Terrains. Human Movement Variability Conference, May 2019. Omaha, NE.
50. Andreasen SC, Wright T, Crenshaw JR, Reisman DS, **Knarr BA**. Determining the relationship between walking activity and inter-day patterns in stroke survivors. Research and Creative Activity Fair. March 2019. Omaha, NE.
51. Remski L, Ackerman J, Lanier AS, Snyder-Mackler L, Buchanan TS, **Knarr BA**. Gait variability after anterior cruciate ligament injury and implications for return-to-play testing. Research and Creative Activity Fair, March 2019.
52. Silva L, Likens A, Rowen D, Vaz J, **Knarr BA**, Stergiou N. Multifractal Analysis of Visually Cued Stride Intervals. 4th Annual Human Movement Variability Conference. May 2019. University of Nebraska at Omaha.
53. Silva L, Likens A, Rowen D, Vaz J, **Knarr BA**, Stergiou N. Synchronization between Stride Time Intervals and External Visual Cueing. 4th Annual Human Movement Variability Conference. May 2019. University of Nebraska at Omaha.
54. Hamer T, Ouattas A, Nimtz K, **Knarr BA**. Examining the minute-to-minute predictability of walking distance across multiple terrains. 3rd Annual Human Movement Variability Conference. May 2018. University of Nebraska at Omaha.
55. Nimtz K, Ouattas A, **Knarr BA**. The Relationship between Linear and Nonlinear Analysis on Activity Data. 3rd Annual Human Movement Variability Conference. May 2018. University of Nebraska at Omaha.
56. Ouattas A, Nimtz K, **Knarr BA**. Knee Proprioception impairments post Total Knee Arthroplasty. 3rd Annual Human Movement Variability Conference. May 2018. University of Nebraska at Omaha.
57. Schleu M, **Knarr BA**. Non-linear analyses for assessing static and dynamic variability using smartphone sensor data. 3rd Annual Human Movement Variability Conference. May 2018. University of Nebraska at Omaha.
58. Ray NT, **Knarr BA**, Higginson JS. Generating Forward Propulsion during User-Driven and Fixed Speed Treadmill Walking. 2018 Center for Biomechanical Engineering Research (CBER) Symposium, 18 May 2018. Newark, DE.
59. Schleu M, **Knarr BA**. Quantifying Static and Dynamic Stability Using Mobile Sensors. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
60. Hamer T, Ouattas A, Nimtz N, **Knarr BA**. Examining the minute-to-minute predictability of walking distance across multiple terrains. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
61. Buffum R, **Knarr BA**. Low cost Instrumentation for Measuring Asymmetries with a Leg Press. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
62. Nimtz K, Ouattas A, **Knarr BA**. The Relationship between Linear and Nonlinear Analysis on Activity Data. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
63. Harrison M, **Knarr BA**. Impact of Real World Environments on Movement Variability. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
64. Dudley D, **Knarr BA**, Zuniga J. The Effects of an Upper Limb Exoskeleton on Brain Activation of a Stroke Patient. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
65. Ouattas A, **Knarr BA**. Knee Joint Proprioception: Effect on Inter-Limb Joint Asymmetry & Dynamic Stability in Post-Total Knee Arthroplasty Patients. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
66. Barajas M, Buffum R, Sack S, Hamer T, **Knarr BA**. Temporal Step Coordination While Walking with a Single Point Cane. Research and Creative Activity Fair 2018. University of Nebraska at Omaha.
67. Ray NT, **Knarr BA**, Higginson JS. Changes in speed during normal and user-driven treadmill walking. Mechanical Engineering Research Day. University of Delaware, 2017.
68. Groff BR, Antonellis P, **Knarr BA**, Stergiou N. Movement variability and sensorimotor cortical activation during backward and forward walking. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
69. Schleu M, **Knarr BA**. Quantifying static and dynamic stability using mobile sensors. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
70. Nimtz K, Marmelat V, **Knarr BA.** Non-linear analysis of vector magnitude and step count from activity monitor data. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
71. Ouattas A, Ray NT, **Knarr BA**. Peak vertical ground reaction force and stance phase time to assess post-TKA interlimb symmetry. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
72. Sack S, Schleu M, **Knarr BA**. Design of an instrumented cane for real-time force feedback. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
73. Reed C, **Knarr BA**. Impact of Real World Environments of Movement Variability. University of Nebraska at Omaha Research and Creative Activity Fair 2017.
74. Ouattas A, Ray N, **Knarr BA.** Vertical ground reaction force & stance phase time to assess post-TKA interlimb asymmetry, Nebraska Research & Innovation Conference Symposium on Biomechanics 2016.
75. Antonellis P, Ray N, **Knarr BA**. Detecting inter-limb differences in movement variability post-TKA using acceleration, Nebraska Research & Innovation Conference Symposium on Biomechanics 2016.
76. Nimtz K, Ray N, **Knarr BA.** Difference in inter-limb knee joint angle variability in patients post-TKA, Nebraska Research & Innovation Conference Symposium on Biomechanics 2016.
77. Reed C, **Knarr BA**. Impact of Real World Environments on Movement Variability, Nebraska Research & Innovation Conference Symposium on Biomechanics 2016.
78. Kempski K, Higginson JS, **Knarr BA**. Interlimb Comparison of Joint Angle Variability Post-Stroke. University of Delaware Undergraduate Research and Service Celebratory Symposium 2016.
79. Ray N, **Knarr BA**. Validation of a real-time adaptive treadmill controller as a clinical research tool. University of Delaware CBER Day Conference 2016.
80. Richardson RT, Quinton R, **Knarr BA**, Russo S, Higginson JS, Richards R. Evaluation of glenohumeral muscle moment arms of a new musculoskeletal model of the shoulder. University of Delaware CBER Day Conference 2016.
81. Ray N, Marmon A, Zeni J, **Knarr BA**. Using acceleration to detect aberrant loading patterns. University of Delaware CBER Day Conference 2016.
82. Nicholson MC, Higginson JS, **Knarr BA.** Knee contact forces and cost of locomotion in stride length controlled walking cases. University of Delaware CBER Day Conference 2016.
83. Justice W, **Knarr BA**. Which Partial Weight Bearing Percentage will be Easiest for Patients to Comply With? University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
84. McCarren G, Richards J, **Knarr BA**. Reducing Torque on the Low Back of Golfers. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
85. Nicholson MC, Higginson JS, **Knarr BA**. Knee Contact Forces and Cost of Locomotion in Constant String Length Walking Cases. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
86. Collin Patterson, Higginson JS, **Knarr BA**. Development and Validation of the SmartBoot: A Biofeedback Device for Partial Weight Bearing Rehabilitation. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
87. Schulman M, Higginson JS, **Knarr BA**. Knee Joint Loading Cost of Locomotion with Changing Stride Length at a Normal Speed. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
88. Zakutney L, Higginson JS, **Knarr BA**. Knee Joint Loading Cost of Locomotion in Response to Varying Stride Lengths at a Slow Speed. University of Delaware Undergraduate Research and Service Celebratory Symposium 2015.
89. Doolin MT, Higginson JS, **Knarr BA**. Evaluation of multiple training paradigms when using biofeedback for learning partial weight bearing. University of Delaware Undergraduate Research and Service Celebratory Symposium 2014.
90. Nicholson MC, Higginson JS, **Knarr BA**. Biofeedback Modality: Is audio or visual a more effective method for training gait asymmetries? University of Delaware Undergraduate Research and Service Celebratory Symposium 2014.
91. **Knarr BA**, Roos MA, Reisman DS. The relationship between walking speed and intensity of daily walking activity in individuals post-stroke. . University of Delaware CBER Day Conference 2014.
92. Khoeilar R, **Knarr BA**, Higginson JS. Muscle Driven Forward Dynamic Simulation of Maximal Vertical Jumping in Three Dimensions. University of Delaware CBER Day Conference 2013.
93. Stanhope VA, **Knarr BA**, Higginson JS. Investigation of Factors associated with Self-Selected Walking Speed in Individuals Post-Stroke. University of Delaware CBER Day Conference 2013.
94. Richardson RT, Thomas KF, **Knarr BA**, Higginson JS. Assessment of Musculoskeletal Models of the Upper Extremity. University of Delaware CBER Day Conference 2013.
95. Seymour KM, Higginson JS, **Knarr BA**. Effect of handrail use on gait patterns in young healthy subjects. University of Delaware CBER Day Conference 2013.
96. **Knarr BA**, Higginson JS. Change in Knee Contact Force Due to Model Kinematics Processing. Center for Biomedical Engineering Research Symposium May 2013, Newark, DE.
97. **Knarr BA**, Zeni JA, Higginson JS. Change in Knee Contact Force with Experimental and Simulated Change in Body Weight. Center for Biomedical Engineering Research Symposium May 2012, Newark, DE.
98. **Knarr BA**, Kesar TM, Helm E, Reisman DS, Binder-Macleod SA, Higginson JS. Evaluation of muscle control strategy changes in post-stroke gait after a functional electrical stimulation intervention using musculoskeletal simulations. Center for Biomedical Engineering Research Symposium May 2010, Newark, DE.
99. **Knarr BA**, Higginson JS. Compensatory Strategies with modeled Muscle Activation Deficiency during Gait. Center for Biomedical Engineering Research Symposium May 2009, Newark, DE.
100. **Knarr BA**, Novotny JE, Zhou H. Finite Element Model of the Biceps Brachii muscle driven by in vivo strain and deformation data. Center for Biomedical Engineering Research Symposium May 2008, Newark, DE.
101. Novotny JE, **Knarr BA**, Zhou H. Strains in the biceps brachii during dynamic elbow flexion show concentric, eccentric and isometric behavior simultaneously. Center for Biomedical Engineering Research Symposium May 2007, Newark, DE.

**Complete list of my published work in PubMed:**

<https://www.ncbi.nlm.nih.gov/sites/myncbi/brian.knarr.1/bibliography/47511147/public>

**Impact of my publications based on citations identified by Google Scholar:**

<https://scholar.google.com/citations?hl=en&user=gPmDAFsAAAAJ&view_op=list_works>