BRADFORD D. HENDERSHOT

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610.390.4491 (cell)

EDUCATION and TRAINING:

2012-2014 **Post-Doctoral Training** – Rehabilitation

Walter Reed National Military Medical Center – Bethesda, MD
Mentors: Erik J. Wolf, PhD and Paul F. Pasquina, MD

2008-2012 **Ph.D. Biomedical Engineering**

Virginia Tech-Wake Forest University – Blacksburg, VA
Advisor: Maury A. Nussbaum, PhD
Dissertation: *"Alterations and Asymmetries in Trunk Mechanics and Neuromuscular Control among Persons with Lower-Limb Amputation: Exploring Potential Pathways of Low Back Pain"*

2004-2008 **B.S. Bioengineering** – Mechanical Engineering Concentration
Minor: Engineering Mechanics

The Pennsylvania State University – University Park, PA

PROFESSIONAL EXPERIENCE and APPOINTMENTS:

Sept. 2014-present **Lead Scientist I** (Henry M. Jackson Foundation); Full Time – 40 hours/week

Walter Reed National Military Medical Center (WRNMMC) – Bethesda, MD
Center for Rehabilitation Sciences Research (CRSR)

- Develop clinically impactful research projects related to secondary injuries (e.g., low back pain and osteoarthritis) following extremity trauma
- Submit grant proposals (n=5) for intra and extramural funding support
- Collect, process, and interpret data from complex multidisciplinary research projects
- Prepare manuscripts (n=3) and abstracts (n=2) for scientific journals and conferences
- With Facility Research Director, manage research/clinical activities and supervise staff within the Biomechanics and CAREN laboratories (since July 2015)
- Deputy Chair, Scientific Review Committee; Ortho, Rehab, and Pain (since July 2015)

Jan. 2014-present **Assistant Professor**

Uniformed Services University of the Health Sciences – Bethesda, MD
Department of Physical Medicine and Rehabilitation

- Support the newly forming department as biomechanics/gait expert

Sept. 2012-Sept. 2014 **Research Biomechanist** (Henry M. Jackson Foundation); Full Time – 40 hrs/week

Walter Reed National Military Medical Center (WRNMMC) – Bethesda, MD
Center for Rehabilitation Sciences Research (CRSR)

- Executed multi-disciplinary research on service members with extremity trauma
- Obtained > $1Million in external grant funding
- Published 5 peer-reviewed manuscripts and presented 4 conference abstracts

June 2008-
July 2012

Graduate Research Assistant; Full Time Student – 20 hrs/week

Virginia Tech – Blacksburg, VA
Industrial Ergonomics & Biomechanics Laboratory

- Led a NIOSH-funded R01 project on occupational risk factors for low back pain
- Published 11 peer-reviewed manuscripts and conference proceedings

Jan. 2007-
May 2008

Undergraduate Research Assistant; Volunteer – 8 hrs/week

The Pennsylvania State University – University Park, PA
Biomechanics Laboratory

- Processed motion capture data from a robotic gait simulator

**Acknowledged in: Okita, N. et al. (2009) An objective evaluation of a segmented foot model.

June 2007-
Aug. 2007

Biomedical Intern; Full Time – 40 hrs/week

Ability Prosthetics and Orthotics, Inc. – Gettysburg, PA

- Job shadowed certified prosthetists and orthotists in all aspects of clinical care

PEER-REVIEWED JOURNAL PUBLICATIONS:

15 Shojaei, I., **Hendershot, B.D.**, Wolf, E.J., and Bazrgari, B. Persons with Unilateral Transfemoral Amputation experience larger spinal loads during level-ground walking compared to able-bodied individuals. *Clinical Biomechanics*, In Press http://dx.doi.org/10.1016/j.clinbiomech.2015.11.018

14 **Hendershot, B.D.**, and Wolf, E.J. (2015) Persons with Unilateral Transfemoral Amputation have Altered Lumbosacral Kinetics during Sitting and Standing Movements. *Gait and Posture* 42(2): 204-9.

13 **Hendershot, B.D.**, and Wolf, E.J. (2015) Mediolateral Joint Powers at the Low Back among Persons with Unilateral Transfemoral Amputation. *Archives of Physical Medicine and Rehabilitation* 96(1): 154-157.

12 Schnall, B.L., **Hendershot, B.D.**, Bell, J.C., and Wolf, E.J. (2014) A Kinematic Analysis of Males with Transtibial Amputation Carrying Military Loads. *Journal of Rehabilitation Research and Development* 51(10): 1505-1514.

11 Pruziner, A.L., Werner, K.M., Copple, T.J., **Hendershot, B.D.**, and Wolf, E.J. (2014) Does Intact Limb Loading Differ in Servicemembers with Traumatic Lower Limb Loss? Symposium: Recent Advances in Amputation Surgery and Rehabilitation *Clinical Orthopaedics and Related Research* 472(10): 3068-75.

10 **Hendershot, B.D.**, and Wolf, E.J. (2014) Three-Dimensional Joint Reaction Forces and Moments at the Low Back during Over-Ground Walking in Persons with Unilateral Lower-Extremity Amputation. *Clinical Biomechanics* 29(3): 235-242.

9 **Hendershot, B.D.**, and Nussbaum, M.A. (2014) Altered Flexion-Relaxation Responses Exist during Asymmetric Trunk Flexion Movements among Persons with Unilateral Lower-Limb Amputation. *Journal of Electromyography and Kinesiology* 24: 120-125.

8 **Hendershot, B.D.**, Toosizadeh, N., Muslim, K., Madigan, M.L., and Nussbaum, M.A. (2013) Evidence for an Exposure-Response Relationship between Trunk Flexion and Impairments in Trunk Postural Control. *Journal of Biomechanics* 46: 2554-2557.

7 **Hendershot, B.D.**, Bazrgari, B., and Nussbaum, M.A. (2013) Persons with Unilateral Lower-Limb Amputation have Altered and Asymmetric Trunk Mechanical and Neuromuscular Behaviors Estimated using Multidirectional Trunk Perturbations. *Journal of Biomechanics* 46: 1907-1912.

6 Toosizadeh, N., Bazrgari, B., **Hendershot, B.D.**, Muslim, K., Nussbaum, M.A., and Madigan, M.L. (2013) Disturbance and Recovery of Trunk Mechanical and Neuromuscular Behaviors Following Repetitive Lifting: Influences of Flexion Angle and Lift Rate on Creep-Induced Effects. *Ergonomics* 56(6): 954-963.

5 **Hendershot, B.D.**, and Nussbaum, M.A. (2013) Persons with Lower-Limb Amputation have Impaired Trunk Postural Control while Maintaining Seated Balance. *Gait and Posture* 38(3): 438-442.

4 Muslim, K., Bazrgari, B., **Hendershot, B.D.**, Toosizadeh, N., Nussbaum, M.A., and Madigan, M.L. (2013) Disturbance and Recovery of Trunk Mechanical and Neuromuscular Behaviors Following Repeated Static Trunk Flexion: Influences of Duration and Duty Cycle on Creep-Induced Effects. *Applied Ergonomics* 44: 643-651.

3 **Hendershot, B.D.**, Bazrgari, B., Nussbaum, M.A., and Madigan, M.L. (2012) Within- and Between-Day Reliability of Trunk Mechanical Behaviors Estimated using Position-Controlled Perturbations. *Journal of Biomechanics* 45: 2019-2022.

2 Bazrgari, B., **Hendershot, B.D.**, Muslim, K., Toosizadeh, N., Nussbaum, M.A., and Madigan, M.L. (2011) Disturbance and Recovery of Trunk Mechanical and Neuromuscular Behaviors Following Prolonged Trunk Flexion: Influences of Duration and External Load on Creep-Induced Effects. *Ergonomics* 54(11): 1043-1052.

1 **Hendershot, B.D.**, Bazrgari, B., Muslim, K., Toosizadeh, N., Nussbaum, M.A., and Madigan, M.L. (2011) Disturbance and Recovery of Trunk Stiffness and Reflexive Muscle Responses Following Prolonged Trunk Flexion: Influence of Flexion Angle and Duration. *Clinical Biomechanics* 26(3): 250-256.

REFEREED CONFERENCE PROCEEDINGS and PRESENTATIONS:

16 **Hendershot, B.D.**, Cooper, J.L., Wolf, E.J., Pruziner, A.L. Gait Speed is Influenced by Secondary Task Difficulty in Persons with Unilateral Transtibial Amputation. *2015 American Society of Biomechanics*, Columbus, OH, USA (August 2015) *& 2015 Military Health System Research Symposium (MHSRS)*, FL, USA.

15 Mahon, C.E., **Hendershot, B.D.**, Wolf, E.J., Pruziner, A.L. (2015) Individual Limb Transition Work during Walking in Service Members with Transfemoral Amputations. *American Society of Biomechanics*, Columbus, OH, USA *& 7th Annual Joint National Capital Region Research Competition*, Bethesda, MD, USA.

14 **Hendershot, B.D.**, Wolf, E.J., and Bazrgari, B. (2014) Changes in Gait following Transfemoral Amputation Increase Spinal Loads. *7th World Congress of Biomechanics*, Boston, MA, USA.

13 **Hendershot, B.D.**, Wolf, E.J., and Pruziner, A.L. (2014) Biomechanical Variability with Increasing Cognitive Demand during Ambulation for Service Members with Lower Limb Amputations. *7th World Congress of Biomechanics*, Boston, MA, USA.

12 **Hendershot, B.D.**, and Wolf, E.J. (2013) Lateral Shear Forces at the Low Back in Persons with Unilateral Transfemoral Amputation during Overground Walking. *American Orthotic and Prosthetic Association O&P World Congress*, Orlando, Florida, USA [ASB abstract invited].

11 **Hendershot, B.D.**, and Wolf, E.J. (2013) Lateral Shear Forces at the Low Back in Persons with Unilateral Transfemoral Amputation during Overground Walking. *Proceedings of the American Society of Biomechanics*, Omaha, Nebraska, USA.

10 **Hendershot, B.D.**, and Nussbaum, M.A. (2012) Reduced and Asymmetric Trunk Stiffness Among Unilateral Lower-Limb Amputees During Multi-Directional Trunk Perturbations. *American Orthotic and Prosthetic Association National Assembly*, Boston, Massachusetts, USA [ASB abstract invited].

9 **Hendershot, B.D.**, and Nussbaum, M.A. (2012) Reduced and Asymmetric Trunk Stiffness Among Unilateral Lower-Limb Amputees During Multi-Directional Trunk Perturbations. *Proceedings of the American Society of Biomechanics*, Gainesville, Florida, USA.

8 Muslim, K., **Hendershot, B.D.**, Toosizadeh, N., Nussbaum, M.A., Bazrgari, B., and Madigan, M.L. (2012) Disturbances to Intrinsic Stiffness and Reflexive Muscle Responses Following Repeated Static Trunk Flexion. *Proceedings of the American Society of Biomechanics*, Gainesville, Florida, USA.

7 **Hendershot, B.D.**, Bazrgari, B., Nussbaum, M.A., and Madigan, M.L. (2011) Comparison of Mechanical and EMG-based Estimates of Trunk Reflexes to Sudden Perturbations. *Biomedical Engineering Society 2011 Annual Meeting*, Hartford, Connecticut, USA.

6 **Hendershot, B.D.**, Bazrgari, B., Nussbaum, M.A., and Madigan, M.L. (2011) Comparison of Mechanical and EMG-based Estimates of Trunk Reflexes to Sudden Perturbations. *10th Annual SBES Graduate Research Symposium*, Blacksburg, Virginia, USA.

5 Miller, E., Bazrgari, B., **Hendershot, B.D.**, Nussbaum, M.A., and Madigan, M.L. (2010) Trunk Dynamics in Response to Position Perturbations. *Biomedical Engineering Society 2010 Annual Meeting*, Austin, Texas, USA.

4 **Hendershot, B.D.**, Bazrgari, B., Muslim, K., Toosizadeh, N., Nussbaum, M.A., and Madigan, M.L. (2010) Disturbances to Intrinsic Stiffness and Reflexive Muscle Responses Following Prolonged Trunk Flexion. *Proceedings of the American Society of Biomechanics*, Providence, Rhode Island, USA.

3 Miller, E., Bazrgari, B., **Hendershot, B.D.**, Nussbaum, M., and Madigan, M. (2010) Dynamic Response of the Trunk to Position Perturbations- Effects of Gender, Preload, and Trunk Angle. *Proceedings of the American Society of Biomechanics*, Providence, Rhode Island, USA.

2 Toosizadeh, N., Bazrgari, B., **Hendershot, B.D.**, Muslim, K., and Nussbaum, M.A. (2010) *In vivo* Load-Relaxation of the Trunk with Prolonged Flexion. *Proceedings of the American Society of Biomechanics*, Providence, Rhode Island, USA.

1 Miller, E., Bazrgari, B., **Hendershot, B.D.**, Nussbaum, M., and Madigan, M. (2010) Dynamic Response of the Trunk to Position Perturbations- Effects of Gender, Preload, and Trunk Angle. *9th Annual SBES Graduate Research Symposium*, Winston-Salem, North Carolina, USA.

BOOK CHAPTER:

Pasquina, P.F., **Hendershot, B.D.**, and Isaacson, B.M. (2015) Secondary Health Effects of Amputation. Atlas of Amputations and Limb Deficiencies: Surgical, Prosthetic, and Rehabilitation Principles, 4th Edition. American Academy of Orthopaedic Surgeons: Rosemont, IL (accepted March 18, 2015).

OTHER PRESENTATIONS:

Loushin, S.R., Wolf, E.J., and **Hendershot, B.D.** Preliminary Analysis of Ground Reaction Force Impulse while Walking in a Virtual Environment. NIH BME Summer Intern Program Research Symposium. August 8, 2015.

La Croix, C.L., and **Hendershot, B.D.** *Struggling to Stay Upright: Amputees and Chronic Back Pain.* DOD-VA Amputation System of Care (ASoC) / Extremity Trauma and Amputation Center of Excellence (EACE) Grand Rounds (Lecture available to all DOD and VA staff). February 18, 2015.

GRANTS AND OTHER FUNDED RESEARCH PROJECTS:

Total value of external sponsored research to date: $1,508,308

Ongoing:

10/14-09/17 *"Evaluation of Spine Health and Spine Mechanics in Service Members with Traumatic Lower-Extremity Amputation or Injury."*
CDMRP FY13 Peer Reviewed Orthopaedic Research Program (PRORP)

Translational Research Award (W81XWH-14-2-0144)
Role: Principal Investigator
Funding: $652,586

01/15-09/16 *"Characterization of Prosthetic Feet for Weighted Walking in Service Members with Lower-Limb Amputations."*
BADER Consortium (W81XWH-11-2-0222)
Role: Co-Investigator (10% effort), PI: Barri L. Schnall
Funding: $401,126

01/15-12/19 *"Trunk Postural Control in Service Members with Lower-Extremity Trauma"*
Bridge Funding for the CRSR
Department of Health Affairs (HU0001-15-2-0003)
Role: Principal Investigator of subaward; PI: Paul F. Pasquina
Funding: $264,869 (subaward cost)

01/15-12/19 "Biomechanical and Cognitive Changes of Walking in Virtual Environments"
Bridge Funding for the CRSR
Department of Health Affairs (HU0001-15-2-0003)
Role: Co-Investigator (10% effort), PI: Paul F. Pasquina
Funding: $24,727 (subaward cost)

Completed:

05/13 *"Assessing Lumbar Spine Motion with Digital Fluoroscopy"*
Equipment Purchase – Amputee Care Program
Extremity Trauma and Amputation Center of Excellence
Role: Principal Investigator
Funding: $165,000

Pending:

"Spinal Loads during Activities of Daily Living: Influences of Lower-Limb Amputation"
National Center for Medical Rehabilitation Research (NIH-NICHD)
Role: Co-Principal Investigator (5% effort), co-PI: Babak Bazrgari (University of Kentucky)
Funding: $150,918; R03 proposal submitted November 12, 2015

"A Modeling and Simulation Framework for Prescription of Passive-Elastic Ankle-Foot Prostheses"
CDMRP FY15 Orthotics and Prosthetics Outcomes Research Award
Role: Co-Investigator (10% effort), PI: Katherine Saul (NC State University)
Funding: $94,000 (subaward cost)

"Rehabilitation and Biopsychosocial Factors Associated with Low Back Pain after Traumatic Lower Limb Amputation"
CDMRP FY15 Orthopaedic Care and Rehabilitation Consortium Award (BADER)
Role: Co-Principal Investigator (15% effort), co-PI: Shawn Farrokhi (NMCSD)
Funding: $1,791,579

"Developing an Evaluation Tool toward the Optimal Running Prosthesis Prescription"
CDMRP FY15 Orthotics and Prosthetics Outcomes Research Award
Role: Co-Investigator (10% effort), PI: Jae Shim (University of Maryland)
Funding: $88,000 (subaward cost)

MENTORSHIP:

Research Staff

2015-pres Amit Doron; 3D Simulation Lead – WRNMMC / BADER
2015-pres Pawel Golyski, BSE; Research Assistant – WRNMMC / BADER
2014-pres Emma Shaw, MA; Research Assistant – WRNMMC / CRSR
2014-2015 Lindsey Petrelle, BSE; Research Assistant – WRNMMC / CRSR
2014-pres Elizabeth Husson, BS; Research Assistant – WRNMMC / CRSR / BADER
2013-pres Caitlin E. Mahon, MSE; Biomedical Research Engineer – WRNMMC / CRSR / EACE
2012-2016 Elizabeth M. Nottingham, BSE; Biomedical Research Engineer – WRNMMC / CRSR / EACE
2012-2013 Johanna C. Bell, MSE; Biomedical Research Engineer – WRNMMC / EACE
2012-2013 Timothy J. Copple, MS; Research Assistant – WRNMMC / CRSR
2012-2013 Kathryn M. Werner, BSE; Research Assistant – WRNMMC / CRSR

Students / Interns

2015-pres Emma Shaw, MA; PhD Student (Kinesiology/Cognitive Neuroscience) – University of Maryland
2015 Stacy Loushin; Undergrad (Univ. of Cincinnati) – NIH BME Summer Intern Program
2015 Natasha Kumar, BS; Recent Kinesiology Graduate (Univ. of Maryland)
2014-2015 Jennie Cooper, BSME; Master's Student Intern (GWU) – WRNMMC / CRSR
2014 Pawel Golyski; Undergrad (Brown Univ.) – NIH BME Summer Intern Program
2013 Jessica A. Fredericks; Undergrad (Univ. of Toledo) – NIH BME Summer Intern Program
2010 Matthew Ruder; Undergrad (St. Louis Univ.) – Virginia Tech BBSI Research Program

PROFESSIONAL MEMBERSHIP and SERVICE:

2012-pres BADER Consortium Affiliate (www.bader-c.org)
2010-pres American Society of Biomechanics (ASB) – National Member
2009-2011 Biomedical Engineering Society (BMES) – National Member and VT Student Chapter
2009-2011 Human Factors and Ergonomics Society (HFES) – VT Student Chapter

2013-pres Abstract Review Committee – American Society of Biomechanics
2015-pres Deputy Chair, Scientific Review Committee
2012-pres Member, Scientific Review Committee
Departments of Ortho, Rehab, and Pain – WRNMMC
2012-pres *Ad hoc* Manuscript Reviewer (~31 papers) for the following journals:

- *Journal of Applied Biomechanics* (n=2)
- *Archives of Physical Medicine and Rehabilitation* (n=2)
- *Journal of Biomechanics* (n=5)
- *BMC Research Notes* (n=1)
- *Clinical Biomechanics* (n=13)
- *Computers in Medicine and Biology* (n=1)
- *Journal of Electromyography and Kinesiology* (n=1)
- *Ergonomics* (n=2)
- *Gait and Posture* (n=1)
- *Gerontology* (n=1)
- *Human Movement Science* (n=1)
- *Journal of Rehabilitation Research & Development (*JRRD; n=3)

RESEARCH EQUIPMENT AND SOFTWARE KNOWLEDGE:

- Optical motion capture
- Force platforms
- Load cells / pressure sensors
- Electromyography
- Electroencephalography
- Digital flouroscopy
- Certified CAREN Operator
- Nexus (Vicon)
- MATLAB (Mathworks)
- Visual3D (C-Motion)
- Pedar / Pliance (Novel)
- BrainVision (Brain Products GmbH)

OTHER CERTIFICATIONS:

BLS for Healthcare Providers (CPR/AED); American Heart Association
Active Security Clearance (Secret); Department of Defense

HONORS AND AWARDS:

2008-2012 Graduate Research Assistantship, Industrial and Systems Engineering, Virginia Tech
2006-2008 SciTech Scholarship; PHEAA NETS Program