

DENNIS E. ANDERSON

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Education

- 2010 **Ph.D. in Engineering Mechanics**
Virginia Polytechnic Institute and State University
- 2009 **Graduate Certificate in Engineering Education**
Virginia Polytechnic Institute and State University
- 2005 **M.S. in Engineering Mechanics**
Virginia Polytechnic Institute and State University
- 2003 **B.S. in Mechanical Engineering**
Texas A&M University

Appointments

- 2015- Assistant Professor of Orthopedic Surgery, Harvard Medical School
- 2014- Staff Scientist, Center for Advanced Orthopaedic Studies, Beth Israel Deaconess Medical Center
- 2013-2015 Instructor in Orthopedic Surgery, Harvard Medical School
- 2013-2014 Research Associate, Center for Advanced Orthopaedic Studies, Beth Israel Deaconess Medical Center
- 2010-2013 Postdoctoral Research Fellow, Harvard Medical School and Center for Advanced Orthopaedic Studies, Beth Israel Deaconess Medical Center

Sponsored Research

Currently Funded

- 2020-2023 DOD CDMRP W81XWH-20-1-0608, "Personalized Computational Modeling to Support Effective Use of Back Support Exosuits to Prevent Back Injuries", Role: PI
- 2019-2020 Osher Center for Integrative Medicine Pilot Research Award, "Measurement and rehabilitation of trunk neuromuscular control in older adults with fall-related wrist fractures", Role: PI
- 2019-2020 National Center for Simulation in Rehabilitation Research Pilot Project Program, "Novel musculoskeletal models to assess spine segmental loads in adolescents with idiopathic scoliosis", Role: PI
- 2020-2025 NIH-NIAMS R01 AR075964 (PI: Ron N. Alkalay), "Predicting Fracture risk in Patients Treated with Radiotherapy for Spinal Metastatic Disease", Role: Co-Investigator
- 2019-2024 NIH-NIAMS UH2AR076724 (PI: Sharmila Majumdar), "Technology Research Site for Advanced, Faster Quantitative Imaging for BACPAC", Role: Co-Investigator
- 2018-2023 NIH-NIAMS R01AR073019 (PI: Mary L. Bouxsein), "Influence of Spinal Loading on Vertebral Fracture", Role: Co-Investigator

Past Awards

- 2019-2020 National Center for Simulation in Rehabilitation Research Pilot Project Program, "Novel

- musculoskeletal models to assess spine segmental loads in adolescents with idiopathic scoliosis”, Role: PI (\$23,148 direct costs)
- 2018 Departmental Research Grant Award, Department of Orthopedics, Beth Israel Deaconess Medical Center, “The Effects of Neurogenic Claudication Symptoms and Decompression Laminectomy on Gait and Posture in Patients with Symptomatic Lumbar Spinal Stenosis”, Role: PI (\$10,000 direct costs)
- 2015-2018 (NCE 2019) NIH-NIA R00AG042458 (Pathway to Independence Award – Independent Phase), “Age-Related Changes in Thoracic Spine Biomechanics”, Role: PI (\$445,241 direct costs)
- 2013-2015 NIH-NIA K99AG042458 (Pathway to Independence Award – Mentored Phase), “Age-Related Changes in Thoracic Spine Biomechanics”, Role: PI (\$165,380 direct costs)
- 2013-2015 American Society for Bone and Mineral Research Mentored Career Development Award, “Contribution of Age-Related Changes in the Rib Cage to Vertebral Loading”, Role: PI (\$75,000 direct costs)
- 2011-2012 Departmental Research Grant Award, Department of Orthopedics, Beth Israel Deaconess Medical Center, “Association of muscle density measured by QCT with trunk muscle strength and endurance”, Role: PI (\$18,300 direct costs)
- 2010-2012 NIH-NIA T32AG023480 (Translational Research in Aging Training Program; PI: Lewis A. Lipsitz), “The variation of trunk intramuscular fat with age, sex and activity level and its effect on muscle strength and vertebral loading”, Role: Post-Doctoral Fellow (\$102,168 direct costs)
- 2008-2010 NIH-NIA F31 AG030904 (NRSA Pre-doctoral Fellowship), “Implications of in vivo muscle loading for hip fracture etiology”, Roles: PI, Pre-Doctoral Fellow (\$57,560 total costs)

Peer-reviewed Research Publications

1. Johannesdottir F, Allaire BT, Kopperdahl DL, Keaveny TM, Sigurdsson S, Bredella MA, Anderson DE, Samelson EJ, Kiel DP, Gudnason VG and Bouxsein ML. Bone density and strength from thoracic and lumbar CT scans both predict incident vertebral fractures independently of fracture location. *Osteoporosis International*, 2020 (accepted). doi: 10.1007/s00198-020-05528-4.
2. Schmid S, Burkhart KA, Allaire BT, Grindle D, Bassani T, Galbusera F, and Anderson DE. Spinal compressive forces in adolescent idiopathic scoliosis with and without carrying loads: a musculoskeletal modeling study. *Frontiers in Bioengineering and Biotechnology*, 8:159, 2020. doi: 10.3389/fbioe.2020.00159.
3. Zhang C, Mannen EM, Sis HL, Cadel ES, Wong BM, Wang W, Cheng B, Friis EA and Anderson DE. Moment-rotation behavior of intervertebral joints in flexion-extension, lateral bending, and axial rotation at all levels of the human spine: a structured review and meta-regression analysis. *Journal of Biomechanics*, 100: 109579, 2020. doi: 10.1016/j.jbiomech.2019.109579
4. Burkhart KA, Allaire BT, Anderson DE, Lee D, Keaveny TM, and Bouxsein ML. Effects of Long-Duration Spaceflight on Vertebral Strength and Risk of Spine Fracture. *Journal of Bone and Mineral Research*, 35(2):269-276, 2020. doi: 10.1002/jbmr.3881
5. Schmid S, Burkhart KA, Allaire BT, Grindle D and Anderson DE. Musculoskeletal full-body models including a detailed thoracolumbar spine for children and adolescents aged 6 to 18 years. *Journal of Biomechanics*, 102:109305, 2020. doi: 10.1016/j.jbiomech.2019.07.049

6. Koushyar H, [Anderson DE](#), Nussbaum MA, Madigan ML. Relative effort while walking is higher among women who are obese, and older women. *Medicine and Science in Sports and Exercise*, 52(1):105-111, 2020. doi: 10.1249/MSS.0000000000002093
7. Zhang C, Meng XJ, [Anderson DE](#), Wang W, Chen C, Tao X, and Cheng B. Effects of Stretch Reflex on Back Muscle Response during Sinusoidal Whole Body Vibration in Sitting Posture: A Model Study. *International Journal of Industrial Ergonomics*, 71:103-110, 2019. doi: 10.1016/j.ergon.2019.02.005
8. Zhang C, Wang W, [Anderson DE](#), Guan S, Li G, Xiang H, Zhao H and Cheng B. Effect of Low-Frequency Vibration on Muscle Response under Different Neurointact Conditions. *Applied Bionics and Biomechanics*, Article ID 1971045, 10 pages, 2019. doi: 10.1155/2019/1971045
9. Allaire BT, Lu D, Johannesdottir F, Kopperdahl D, Keaveny TM, Jarraya M, Guermazi A, Bredella MA, Samelson EJ, Kiel DP, [Anderson DE](#), Demissie S, and Bouxsein ML. Prediction of incident vertebral fracture using CT-based finite element analysis. *Osteoporosis International*, 30(2):323-331, 2019. doi: 10.1007/s00198-018-4716-1
10. Lorbergs AL, Allaire BT, Yang L, Kiel DP, Cupples LA, Jarraya M, Guermazi A, Trivison TG, Bouxsein ML, [Anderson DE](#), Samelson EJ. A longitudinal study of trunk muscle properties and severity of thoracic kyphosis in women and men: The Framingham Study. *Journal of Gerontology: Series A* 74(3):420-427, 2019. doi: 10.1093/gerona/gly056
11. Schmidt CT, Ward RE, Suri P, Kiely DK, Goldstein R, Ni P, [Anderson DE](#) and Bean JF. Which neuromuscular attributes are associated with changes in mobility among community-dwelling older adults with symptomatic lumbar spinal stenosis? *Archives of Physical Medicine and Rehabilitation*, 99(11): 2190-2197, 2018. doi: 10.1016/j.apmr.2018.04.019
12. Mousavi SJ, Tromp R, Swann MC, White AP, and [Anderson DE](#). Between-session reliability of opto-electronic motion capture in measuring sagittal posture and 3-D ranges of motion of the thoracolumbar spine. *Journal of Biomechanics*, 79:248-252, 2018. doi: 10.1016/j.jbiomech.2018.08.033.
13. Mannen EM, Friis EA, Sis HL, Wong BM, Cadel ES and [Anderson DE](#). The Rib Cage Stiffens the Thoracic Spine in a Cadaveric Model with Body Weight Load under Dynamic Moments. *Journal of the Mechanical Behavior of Biomedical Materials* 84: 258-264, 2018. doi: 10.1016/j.jmbbm.2018.05.019
14. Johannesdottir F, Allaire B, [Anderson DE](#), Samelson EJ, Kiel DP and Bouxsein ML. Population-based study of age- and sex-related differences in muscle density and size in thoracic and lumbar spine: the Framingham study. *Osteoporosis International*, 29(7): 1569-1580, 2018. doi.org/10.1007/s00198-018-4490-0
15. Zhang C, Wang W, Chen C, Zeng C, [Anderson DE](#), and Cheng B. Determination of Optimal Electroencephalography Recording Locations for Detecting Drowsy Driving. *IET Intelligent Transport Systems* 12(5):345-350, 2018. doi: 10.1049/iet-its.2017.0083
16. [Anderson DE](#), Mannen EM, Tromp R, Wong BM, Sis HL, Cadel ES, Friis EA and Bouxsein ML. The rib cage reduces intervertebral disc pressures in cadaveric thoracic spines by sharing loading under applied dynamic moments. *Journal of Biomechanics*, 70: 262-266, 2018. doi: 10.1016/j.jbiomech.2017.10.005
17. Burkhart KA, Bruno AG, Bouxsein ML, Bean JF and [Anderson DE](#). Maximum Muscle Stress of Trunk Extensor Muscles in Older Adults using Subject-Specific Musculoskeletal Models. *Journal of Orthopaedic Research*, 36(1):498-505, 2018. doi: 10.1002/jor.23630
18. Schmidt CT, Ward RE, Suri P, Kiely DK, Ni P, [Anderson DE](#) and Bean JF. The association of neuromuscular attributes with performance-based mobility among older primary care patients with

- symptomatic lumbar spinal stenosis. *Archives of Physical Medicine and Rehabilitation*, 98(7): 1400-1406, 2017. doi: 10.1016/j.apmr.2017.02.028
19. Bruno AG, Burkhart KA, Allaire BT, Anderson DE and Bouxsein ML. Spinal loading patterns from biomechanical modeling explain high incidence of vertebral fractures in the thoracolumbar region. *Journal of Bone and Mineral Research*, 32(6):1282-1290, 2017. doi: 10.1002/jbmr.3113
 20. Bruno AG, Mokhtarzadeh H, Allaire BT, Velie KR, De Paolis Kaluza MC, Anderson DE and Bouxsein ML. Incorporation of CT-based measurements of trunk anatomy into subject-specific musculoskeletal models of the spine influences vertebral loading predictions. *Journal of Orthopedic Research*, 35(10):2164-2173, 2017. doi: 10.1002/jor.23524
 21. Allaire BT, De Paolis Kaluza MC, Bruno AG, Samelson EJ, Kiel DP, Anderson DE and Bouxsein ML. Evaluation of a new approach to compute intervertebral disc height measurements from lateral radiographic views of the spine. *European Spine Journal*, 26(1):167-172, 2017. doi: 10.1007/s00586-016-4817-5
 22. Galvis SN, Arnold J, Mannen EM, Wong BM, Sis HL, Cadel ES, Anderson JT, Anderson DE, Arnold PM and Friis EA. Biomechanical evaluation of a growth-friendly rod construct. *Spine Deformity*, 5(1): 11-17, 2017. doi: 10.1016/j.jspd.2016.09.003
 23. Schmidt CT, Ward RE, Suri P, Kurlinski L, Anderson DE, Kiely DK and Bean JF. Health characteristics, mobility and neuromuscular attributes among primary care patients with symptomatic lumbar spinal stenosis: a preliminary study. *Journal of Geriatric Physical Therapy*, 40(3): 135-142, 2017. doi: 10.1519/JPT.0000000000000085
 24. Sis HL, Mannen EM, Cadel ES, Wong BM, Bouxsein ML, Anderson DE and Friis EA. Effect of follower load on motion and stiffness of the human thoracic spine with intact rib cage. *Journal of Biomechanics*, 49(14): 3252-3259, 2016. doi: 10.1016/j.jbiomech.2016.08.003
 25. Yau MS, Demissie S, Zhou Y, Anderson DE, Lorbergs AL, Kiel DP, Allaire BT, Yang L, Cupples LA, Trivison TG, Bouxsein ML, Karasik D and Samelson EJ. Heritability of thoracic kyphosis and genetic correlations with other spine traits: Framingham QCT Study. *Journal of Bone and Mineral Research*, 31(12): 2077-2084, 2016. doi: 10.1002/jbmr.2925
 26. Anderson DE, Mannen EM, Sis HL, Wong BM, Cadel ES, Friis EA and Bouxsein ML. Effects of follower load and rib cage on intervertebral disc pressure and sagittal plane curvature in static tests of cadaveric thoracic spines. *Journal of Biomechanics*, 49(7): 1078-1084, 2016. doi: 10.1016/j.jbiomech.2016.02.038
 27. Anderson DE, Quinn E, Parker E, Allaire B, Muir JW, Rubin CT, Magaziner J, Hannan MT, Bouxsein ML and Kiel DP. Associations of computed tomography-based trunk muscle size and density with balance and falls in older adults. *Journal of Gerontology: Medical Sciences*, 71(6): 811-816, 2016. doi: 10.1093/gerona/glv185
 28. Meng XJ, Anderson DE, Wang W, Bruno AG, Tao X, Zhang C, and Cheng B. [Computational determination and validation of the driver lumbar loadings]. *Qiche Gongcheng/Automotive Engineering*, 38(5): 614-619, 2016. [in Chinese]
 29. Meng XJ, Wang W, Anderson DE, Bruno AG, and Cheng B. [A study of the effects of lumbar support on the driver's lumbar loading]. *Qiche Gongcheng/Automotive Engineering*, 38(2): 206-210, 2016. [in Chinese]
 30. Meng XJ, Bruno AG, Cheng B, Wang W, Bouxsein ML and Anderson DE. Incorporating six degree-of-freedom intervertebral joint stiffness in a lumbar spine musculoskeletal model – method and

- performance in flexed postures. *Journal of Biomechanical Engineering*, 137(10): 101008, 2015. doi: 10.1115/1.4031417
31. Bruno AG, Bouxsein ML, and Anderson DE. Development and validation of a musculoskeletal model of the fully articulated thoracolumbar spine and rib cage. *Journal of Biomechanical Engineering*, 137(8): 081003, 2015. doi: 10.1115/1.4030408
 32. Anderson DE, Franck, CT and Madigan ML. Age differences in the required coefficient of friction during level walking do not exist when experimentally-controlling speed and step length. *Journal of Applied Biomechanics* 30(4): 542-546, 2014. doi:10.1123/jab.2013-0275
 33. Anderson DE and Madigan ML. Healthy older adults have insufficient hip range of motion and plantar flexor strength to walk like healthy young adults. *Journal of Biomechanics* 47(5): 1104-1109, 2014. doi:10.1016/j.jbiomech.2013.12.024
 34. Anderson DE, Bean JF, Holt NE, Keel JC and Bouxsein ML. CT-based muscle attenuation and electrical impedance myography as indicators of trunk muscle strength independent of muscle size in older adults. *American Journal of Physical Medicine & Rehabilitation* 93(7): 553-561, 2014. doi:10.1097/PHM.0000000000000059
 35. Anderson DE, Demissie S, Allaire BT, Bruno AG, Kopperdahl DL, Keaveny TM, Kiel DP and Bouxsein ML. The associations between QCT-based vertebral bone measurements and prevalent vertebral fractures depend on the spinal locations of both bone measurement and fracture. *Osteoporosis International* 25(2): 559-566, 2014. doi:10.1007/s00198-013-2452-0
 36. Anderson DE and Madigan ML. Effects of age-related differences in femoral loading and bone mineral density on strains in the proximal femur during controlled walking. *Journal of Applied Biomechanics* 29(5): 505-516, 2013.
 37. Anderson DE, D'Agostino JM, Bruno AG, Demissie S, Kiel DP and Bouxsein ML. Variations of CT-Based Trunk Muscle Attenuation by Age, Sex and Specific Muscle. *Journal of Gerontology: Medical Sciences* 68(3): 317-323, 2013. doi:10.1093/gerona/GLS168
 38. Bruno AG, Anderson DE, D'Agostino JM and Bouxsein ML. The effect of thoracic kyphosis and sagittal plane alignment on vertebral compressive loading. *Journal of Bone and Mineral Research* 27(10): 2144-2151, 2012. doi:10.1002/jbmr.1658
 39. Anderson DE, D'Agostino JM, Bruno AG, Manoharan RK and Bouxsein ML. Regressions for estimating muscle parameters in the thoracic and lumbar trunk for use in musculoskeletal modeling. *Journal of Biomechanics* 45: 66-75, 2012. doi:10.1016/j.jbiomech.2011.10.004
 40. Anderson DE, Nussbaum MA and Madigan ML. A new method for gravity correction of dynamometer data and determining passive elastic moments at the joint. *Journal of Biomechanics* 43: 1220-1223, 2010.
 41. Anderson DE, Madigan ML and Nussbaum MA. An algorithm for directly fitting a moment-angle-angular velocity model to maximum voluntary muscular moments measured with an isokinetic dynamometer. *Isokinetics and Exercise Science* 17: 51-56, 2009.
 42. Bieryla KA, Anderson DE and Madigan ML. Estimations of relative effort during sit-to-stand increase when accounting for variations in maximum voluntary torque with joint angle and angular velocity. *Journal of Electromyography and Kinesiology*, 19(1): 139-144, 2009.
 43. Anderson DE, Madigan ML and Nussbaum MA. Maximum voluntary joint torque as a function of joint angle and angular velocity: model development and application to the lower limb. *Journal of Biomechanics* 40: 3105-3113, 2007.

44. Anderson DE and Cotton JR. Mechanical analysis of percutaneous sacroplasty using CT image based finite element models. *Medical Engineering and Physics* 29: 316-325, 2007.

Other Scholarly Publications (Book Chapters, Reviews, Conference Papers)

1. Anderson DE, Burkhart K, Alemi MM, and Boussein ML. Biomechanics of Hip and Vertebral Fractures. In: Marcus R, Dempster DW, Cauley JA, and Feldman D (eds). *Osteoporosis, Fifth Edition*, (forthcoming, 2020).
2. Burkhart KA, Anderson DE, and Stirling L. Estimating Compressive Spinal Loads due to Planetary Space Suits. *International Conference on Environmental Systems, ICES-2020-541*, 2020.
3. Mousavi SJ, Anderson DE, van Dieen J. Low back pain: Moving toward mechanism-based management. *Clinical Biomechanics*, 61: 190-191, 2019. doi: 10.1016/j.clinbiomech.2018.12.010
4. Mannen EM and Anderson DE. Mechanical Testing of the Thoracic Spine and Related Implants. In: Friis EA (ed). *Mechanical Testing of Orthopaedic Implants*, Woodhead Publishing, pp. 143-160, 2017.
5. Mokhtarzadeh H, Anderson DE. The role of trunk musculature in osteoporotic vertebral fractures: implications for prediction, prevention and management. *Current Osteoporosis Reports*, 14(3): 67-76, 2016. doi: 10.1007/s11914-016-0305-4
6. Anderson DE, Bruno AG and Boussein ML. Biomechanics of Hip and Vertebral Fractures. In: Marcus R, Feldman D, Dempster DW, Luckey M, and Cauley JA (eds). *Osteoporosis, Fourth Edition, Volume 1*, Academic Press, pp. 497-516, 2013.
7. Anderson DE and Boussein ML. Factor of Risk for Fracture. In: Silva MJ and Guo XE (eds). *Skeletal Aging and Osteoporosis: Biomechanics and Mechanobiology*, Springer, Verlag, pp. 133-150, 2013.

Submitted Manuscripts

1. Grindle DM, Mousavi SJ, Allaire BT, White AP, and Anderson DE. Validity of flexicurve and motion capture for measurements of thoracic kyphosis versus standing radiographic measurements. Submitted to *JOR Spine*, 30 January 2020.
2. Burkhart K, Grindle D, Boussein ML and Anderson DE. Between-session Reliability of Subject-Specific Musculoskeletal Models of the Spine Derived from Optoelectronic Motion Capture Data. Submitted to *Journal of Biomechanics*, 16 April 2020.

Fellowships, Honors and Awards

Travel Award, National Center for Simulation in Rehabilitation Research, 2017

Outstanding Researcher Award, National Center for Simulation in Rehabilitation Research, 2014

Young Investigator Travel Grant, American Society for Bone and Mineral Research Annual Meeting, 2011 & 2013

Young Investigator Award, American Society for Bone and Mineral Research Forum on Aging and Skeletal Health, 2011

Beth Israel Deaconess Medical Center / Harvard Translational Research in Aging Training Program, Fellow, 2010-2012

Ruth L. Kirschstein National Research Service Award for Individual Predoctoral Fellows, 2008-2010

Finalist (Honorable Mention), PhD Student Paper Competition, Podium Presentation, Solids, Design and Rehabilitation Engineering Category, ASME Summer Bioengineering Conference, 2010

Manual Stein Scholarship, Department of Engineering Science and Mechanics, Virginia Tech, 2008-2009

Graduate Research Development Program Grants, Virginia Tech, 2006 & 2008

Graduate Teaching Fellowship, Department of Engineering Science and Mechanics, Virginia Tech, 2007

Pratt Fellowship, Department of Engineering Science and Mechanics, Virginia Tech, 2006

Undergraduate Summer Research Grants Program, Texas A&M University, 2002

College of Engineering Distinguished Student Award, Texas A&M University, 2000

Selected Conference Abstracts (from 60+ total)

1. Burkhart K, Grindle D, Boussein ML, and Anderson DE . “Between-session Reliability of Subject-Specific Musculoskeletal Models of the Spine Derived from Optoelectronic Motion Capture Data” *44th Annual Meeting of the American Society of Biomechanics*, [hosted virtually], August 4-7, 2020. (poster)
2. Grindle D, Mousavi SJ, Allaire BT, White AP, and Anderson DE. “Correlations among standing radiographic and non-radiographic sagittal thoracic kyphosis measures”, *XXVII Congress of the International Society of Biomechanics / 43rd Annual Meeting of the American Society of Biomechanics*, Calgary, Canada, July 31-August 4, 2019. (podium)
3. Schmid S, Burkhart K, Allaire, BT, Grindle D, Boussein ML and Anderson DE. “Musculoskeletal Modeling of the Spine in Children and Adolescents: A Validation Study”, *XXVII Congress of the International Society of Biomechanics / 43rd Annual Meeting of the American Society of Biomechanics*, Calgary, Canada, July 31-August 4, 2019. (podium)
4. Schmid S*, Burkhart K, Allaire, BT, Grindle D, Boussein ML and Anderson DE. “Musculoskeletal Full-Body Models Including a Detailed Thoracolumbar Spine for Children and Adolescents”, *25th Congress of the European Society of Biomechanics (ESB 2019)*, Vienna, Austria, July 7-10, 2019. (podium)
5. Rudolph SE, Caksa S, Anderson DE, and Boussein ML. “Mechanisms of Injury Associated with Non-Traumatic Vertebral Fractures in Older Adults”, *American Society for Bone and Mineral Research 2018 Annual Meeting*, Montreal, Quebec, Canada, September 28 – October 1, 2018 (poster)
6. Mousavi SJ, Tromp R, and Anderson DE. “Between-Session Reliability of Opto-electronic Motion Capture for Measuring Three-Dimensional Spinal Range of Motion *In Vivo*”, *World Congress of Biomechanics*, Dublin, Ireland, July 8-12, 2018 (poster)
7. Mousavi SJ, Tromp R, Tevenan J, and Anderson DE. “Reliability Of Retroreflective Markers In Measuring Sagittal Spine Curvature And Pelvic Tilt And Comparison With Non-Radiographic Methods”, *41st Annual Meeting of the American Society of Biomechanics*, Boulder, CO, August 8-11, 2017 (poster).
8. Anderson DE, Mannen EM, Tromp R, Wong BM, Sis HL, Cadel ES, Friis EA and Boussein ML. “The rib cage affects intervertebral disc pressures in dynamic tests of cadaveric thoracic spines”, *2nd International Workshop on Spine Loading and Deformation*, Berlin, Germany, May 18-20, 2017 (oral presentation).
9. Mokhtarzadeh H, Burkhart K, Allaire B, Lu D, Demissie S, Kopperdahl D, Keaveny TM, Samelson EJ, Kiel DP, Anderson DE and Boussein ML. “Patient-specific musculoskeletal model of the spine: implication for prediction of incident vertebral fractures”, *American Society for Bone and Mineral Research 2016 Annual Meeting*, Atlanta, GA, September 16-19, 2016 (podium)

Teaching Experience

Instructor

ESM 2204, Mechanics of Deformable Bodies, Virginia Tech, Spring 2009

- Students learned basic concepts of deformation, stress and strain, including stress-strain relationships, beam bending, stress transformations and calculating allowable loads.

ESM 3064, Mechanical Behavior of Materials Laboratory, Virginia Tech, Spring 2008

- Students took part in mechanical testing of engineering materials under static, dynamic, creep, and fatigue loads, and learned to analyze, interpret and report experimental data.

ESM 4105, Engineering Analysis of Physiologic Systems, Virginia Tech, Fall 2007

- Students were introduced to human physiology, and learned to describe physiologic systems using engineering concepts such as feedback control and heat and mass transfer.

Center for the Enhancement of Engineering Diversity ASPIRE Program - Introduction to Engineering Course, Virginia Tech, Summer 2004

- Academic course presenting basic engineering concepts and problem solving as part of a 5-week summer orientation program for incoming freshman engineering students.

Teaching Assistant

ESM 2074, Computational Methods, Virginia Tech, Spring 2004 and Spring 2005

ESM 2304, Dynamics, Virginia Tech, Fall 2003 and Fall 2004

ESM 2104, Statics, Virginia Tech, Summer 2003

Invited Talks and Presentations

- 2020 Guest lecture, ME 0123 – Biomechanics, Tufts University, Medford/Somerville, MA
- 2017 Human Factors Modeling and Simulation Workshop, DOD Human Factors Engineering Technical Advisory Group, Meeting 71, Atlantic City, NJ
- 2015 Department of Mechanical and Materials Engineering, University of Denver, Denver, CO
- 2015 OpenSim Webinar: "Meet Me in the Middle: a Thoracolumbar Spine and Rib Cage Model in OpenSim", available at: <https://www.youtube.com/watch?v=yJGK7JN7rTg>
- 2015 College of Engineering, University of Wisconsin – Milwaukee, Milwaukee, WI
- 2015 Department of Biomedical Engineering, George Washington University, Washington D.C.
- 2015 Guest lecture, ME 5665 - Musculoskeletal Biomechanics, Northeastern University, Boston, MA
- 2014 Department of Mechanical Engineering, Texas A&M University, College Station, TX
- 2014 Department of Mechanical Engineering, The University of Kansas, Lawrence, KS
- 2014 Graduate Biomechanics Seminar, Northeastern University, Boston, MA
- 2012 Aging and Gait Symposium, American Society of Biomechanics Annual Meeting, Gainesville, FL
- 2011 Institute for Aging Research, Hebrew SeniorLife, Boston, MA

Professional and Academic Affiliations

American Society for Bone and Mineral Research (ASBMR), 2011-present

American Society of Biomechanics (ASB), 2005-present

American Society of Mechanical Engineers (ASME), 2009-present

Gerontological Society of America (GSA), 2011-present

Orthopaedic Research Society (ORS), 2016-present

Kappa Theta Epsilon

Phi Kappa Phi

Professional and Academic Service

Editorial Board Member, *Journal of Applied Biomechanics*, 2019-present

Journal peer reviewer: *Archives of Gerontology and Geriatrics*; *Biomechanics and Modeling in Mechanobiology*; *BMC Musculoskeletal Diseases*; *Bone*; *Clinical Biomechanics*; *Computers in Biology and Medicine*; *European Journal of Applied Physiology*; *Gait and Posture*; *Human Movement Science*; *International Journal of Industrial Ergonomics*; *International Journal of Solids and Structures*; *Journal of Biomechanics*; *Journal of Bone and Mineral Research*; *Journal of Electromyography & Kinesiology*; *Journal of Gerontology: Medical Sciences*; *Journal of Orthopedic Research*; *Medical Engineering & Physics*; *Osteoporosis International*; *PLOS One*; *Spine*

Thesis Committees: Katelyn Burkhart (Ph.D., Harvard-MIT, 2019); Conor Cullinane (Ph.D., Harvard-MIT, 2018).

Abstract reviewer for the American Society of Biomechanics Annual Meetings, 2012, 2015, 2017, 2020

Grant reviewer for the Swiss National Science Foundation, 2015, 2017, 2018

Session Co-Chair,

Abstract reviewer for the American Society for Bone and Mineral Research Annual Meeting, 2016

NSF BMMB Review Panel, 2016

NASA HERO Musculoskeletal Review Panel, 2016

Grant reviewer for the American Society for Bone and Mineral Research Grants in Aid Program, 2014

Grant reviewer for the Smith Family Awards Program for Excellence in Biomedical Research, 2013

Abstract reviewer for the Gerontological Society of America Annual Scientific Meeting, 2013

Session Co-Chair, *2012 Meeting of the American Society of Biomechanics*, August 15-18, 2012

Session Chair, *64th Annual Scientific Meeting of the Gerontological Society of America*, Boston, MA, November 18-22, 2011

Judicial Panelist in the Graduate Honor System, Virginia Tech, 2009-2010

Coordinator - Biomechanics Journal Club, Virginia Tech Center for Applied Biomechanics, 2007-2008

Additional Training Activities and Courses Taken

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| 2014-2015 | Certificate in Applied Biostatistics, Harvard Catalyst –The Harvard Clinical and Translational Science Center (lectures and practicums in statistical analysis) |
| 2013 | HST-010, Human Functional Anatomy, Harvard Medical School (gross anatomy lectures and laboratory dissections) |
| 2012 | Responsible Conduct of Research, Harvard University (fulfills NIH and NSF requirements for Instruction in the Responsible Conduct of Research) |
| 2011-2012 | Young Investigators Initiative Workshops, US Bone and Joint Initiative (selective grant-writing mentoring program) |
| 2011 | EPI 254, Epidemiology of Aging, Harvard School of Public Health (lectures and discussions on methodological and clinical issues important to studies of older persons) |
| 2010-2012 | Advanced Aging Research Training Seminar Series, Hebrew SeniorLife Institute for Aging Research (monthly research training meetings for junior investigators conducting aging-related research across a variety of disciplines) |