



Jessica Isaacs, Ph.D., P.E.

Managing Engineer | Biomechanics
Philadelphia
+1-215-594-8909 | jisaacs@exponent.com

Professional Profile

Dr. Isaacs has a multidisciplinary background conducting research in bioengineering, materials science and engineering, and mechanical engineering. At Exponent, she focuses on issues involving human injury biomechanics and evaluates kinematics and mechanisms of injury.

Dr. Isaacs' work includes evaluation of injuries occurring in vehicular, pedestrian, occupational, recreational, and fall-related accidents, as well as injuries associated with the use of consumer products.

Her doctoral research at Drexel University focused on spine biomechanics, the effects of degeneration and age on the intervertebral disc, and injectable hydrogels. She completed a Fulbright Fellowship at Tel Aviv University in Israel. During her time in Israel, she investigated predictive multi-parametric computational biomechanical models for diagnosis, management, and repair of lumbar spine pathology, as well as characterizing fiber reinforced bio-composite materials.

Prior to joining Exponent, Dr. Isaacs was a visiting assistant professor in the mechanical engineering department at Widener University. During her tenure she taught a variety of undergraduate courses, acted as faculty advisor for the Society of Automotive Engineers, and participated in a myriad of STEM outreach events.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering and Mechanics, Drexel University, 2012

M.S., Mechanical Engineering and Mechanics, Drexel University, 2009

B.S., Mechanical Engineering, Widener University, 2006

ASME Nominee New Faces of Engineering, 2015

Fulbright Scholar, Tel Aviv University, 2012-2013

United States Department of Education GAANN Fellow, 2007-2011

Widener University's Service and Leadership Award, 2006

Tau Beta Pi Honor Society

Licenses and Certifications

Professional Engineer Mechanical, Delaware, #21997

Academic Appointments

Visiting Assistant Professor, Mechanical Engineering Department, Widener University, 2013-2015

Post-doctoral Appointment, Mechanical Engineering Department, Tel Aviv University, 2012-2013

Professional Affiliations

American Society of Mechanical Engineers (member)

ASTM International, F-27 Snow and Water Sports (member)

Publications

Isaacs JL, George J, Campolettano E, Cutcliffe H, Miller B. "The role of three-point restraints for occupants in moderate severity frontal collisions." Society of Automotive Engineers (SAE) Technical Paper 2022-01-0845

Toney Bolger M, Isaacs JL, Rapp van Roden E, Croteau J, Dibb A. "Seat belt latch plate design and pretensioner deployment strategies have limited effect on in- and out-of-position occupants in high-severity rear-end collisions." Society of Automotive Engineers (SAE) Technical Paper 2022-01-0849, 2022

Croteau J, Toney Bolger M, Isaacs JL, Shurtz B, Zolock J. "Seatback strength and its effect on in-position and out-of-position atd loading in high-speed rear impact sled tests." Society of Automotive Engineers (SAE) Technical Paper 2022-01-0856, 2022

Isaacs JL, Campbell IC, Watson H, Toney Bolger ME. "Head and neck loading trends in IIHS side impact testing." Topic Key Note Presentation/Paper, Fédération Internationale des Sociétés d'Ingénieurs des Techniques de l'Automobile (FISITA) World Congress, Prague, Czech Republic (virtual), September 14-16, 2021. Outstanding Paper Award

Toney Bolger M, Sherman S, Isaacs J, Garman C, Dibb A. "An evaluation of near- and far-side occupant responses to low- to moderate-speed side impacts." Society of Automotive Engineers (SAE) Technical Paper 2020-01-1218, 2020

Davis MS, Isaacs JL, Graber MA, Fisher JL. "Thoracic spine extension injuries in occupants with pre-existing conditions during rear end collisions." Society of Automotive Engineers (SAE) Technical Paper 2019-01-1222, 2019

Scanlon JM, Isaacs JL, Garman CMR. "Head and neck loading conditions over a decade of IIHS rear impact seat testing." Society of Automotive Engineers (SAE) Technical Paper 2019-01-1227, 2019

Sharabi M, Benayahu D, Benayahu Y, Isaacs JL, Haj-Ali R. "Laminated collagen-fiber bio-composites for soft-tissue bio-mimetics." Composites Science and Technology 2015; 117:268-276.

Isaacs JL, Vresilovic E, Sarkar S, Marcolongo M. "Role of biomolecules on annulus fibrosus mechanics: Effect of enzymatic digestion on micromechanics." Journal of the Mechanical Behavior of Biomedical Materials 2014; 40:75-84.

Cannella M, Isaacs JL, Allen S, Orana A, Vresilovic E, Marcolongo M. Nucleus Implantation: "The

biomechanics of augmentation versus replacement with varying degrees of nucleotomy." Journal of Biomechanical Engineering 2014; 136(5).

Isaacs JL. "Micromechanics of the annulus fibrosus: Role of biomolecules in mechanical function." Doctoral Dissertation, Drexel University, 2012.

Selected Presentations and Published Abstracts

Isaacs JL, Toney Bolger ME, Campbell IC. "Cervical spine loading during asymmetrical non-injurious physical activities." Podium Presentation, XXVII Congress of the International Society of Biomechanics (ISB) /43rd Annual Meeting of the American Society of Biomechanics (ASB), Calgary, Canada, July 31 - August 4, 2019.

Davis MS, Isaacs JL, Graber MA, Fisher JL. "Thoracic spine extension injuries in occupants with pre-existing conditions during rear-end collisions." Podium Presentation, International Mechanical Engineering Congress & Exposition (IMECE), Pittsburgh, PA, November 11-15, 2018.

Isaacs JL, Bellezza A, Brown, V. "Sports concept design: An entrepreneurial co- and extra-curricular activity." Podium Presentation, Spring 2015 Mid-Atlantic American Society for Engineering Education (ASEE) Conference, Villanova, PA, April 2015.

Isaacs JL, Binetti V, Lowman A, Marcolongo MS. "Testing methods for evaluation of injectable nucleus replacement." Podium Presentation, Philadelphia Spine Research Symposium, Philadelphia, PA, October 2014.

Isaacs JL, Vresilovic E, Marcolongo MS. "Role of biomolecules on cross-ply mechanics of annulus fibrosus." Podium Presentation, Society for Biomaterials Meeting (SFB), Orlando FL, April 2011. STAR (Student Travel Award Recognition) Honorable Mention.

Isaacs JL, Vresilovic E, Marcolongo MS. "Micromechanical characterization of Annulus Fibrosus Lamellar." Poster Presentation, Society for Biomaterials Meeting (SFB), Orlando, FL, April 2011.

Selected Poster Presentations

Mattucci M, Jendrus J, Angelucci M, Neidert J, Mauger J, Isaacs JL. "Posterior vertebral fixation: Screw-to-screw cross-connection concept investigation." Poster Presentation, Biomedical Engineering Society (BMES) 2015 Annual Meeting, Tampa, FL, October 7-10, 2015.

Isaacs JL, Binetti V, Lowman A, Marcolongo MS. "Test methodology of characterizing the behavior of injectable hydrogels: An in vitro model." Poster Presentation, Society for Biomaterials (SFB), Charlotte, NC, April 2015.

Isaacs JL, Vresilovic E, Marcolongo MS. "Role of macromolecules on micromechanics of the annulus fibrosus." Poster Presentation, Orthopedic Research Society Meeting (ORS), San Francisco, CA, February 2012.

Isaacs JL, Vresilovic E, Marcolongo MS. "What role does macromolecules play in annular mechanics?" Poster Presentation, Philadelphia Spine Research Society International Meeting, Philadelphia, PA, December 2011. Best Poster Award: Biomechanics and Imaging.

Isaacs JL, Vresilovic E, Marcolongo MS. "Role of biomolecules on circumferential mechanics of the annulus fibrosus." Poster and Podium Presentations, International Society for the Study of the Lumbar Spine Meeting (ISSLS), Gothenburg, Sweden, June 2011. Distinguished Poster Award.

Isaacs JL, Vresilovic E, Marcolongo MS. "Enzymatic digestion effects on mechanics of radial annulus fibrosus samples." Poster Presentation, Orthopedic Research Society Meeting (ORS), Long Beach, CA,

January 2011.

Isaacs JL, Bonfiglio D, Gidvani S, Vresilovic E, Marcolongo MS. "Effect of enzymatic digestion on mechanics of in-plane annulus fibrosus lamellae." Poster Presentation, Orthopedic Research Society Meeting (ORS), New Orleans, LA, March 2010.

Isaacs JL, Gidvani S, Sarkar S, Bonfiglio D, Vresilovic E, Doebling T, Marcolongo MS. "The role of macromolecular components in the micromechanics of the annulus fibrosus." Poster Presentation, Society for Biomaterials Meeting (SFB), San Antonio, TX, April 2009.

Isaacs JL, Gidvani S, Sarkar S, Bonfiglio D, Vresilovic E, Doebling T, Marcolongo MS. "Toward a model of intervertebral disc herniation using normal and degenerative failure criteria based on annulus fibrosus laminar micromechanics." Poster Presentation, Philadelphia Spine Research Symposium, Philadelphia, PA, November 2008.