



**Exponent®**  
Engineering & Scientific Consulting

**Bianca Davila-Montero, Ph.D.**

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## Professional Profile

Dr. Dávila-Montero is a biomechanics expert specializing in soft tissue mechanics, with experience evaluating injury mechanisms related to traumatic brain injury, blast exposure, spinal injury, and fluid–solid interactions.

Her work focuses on traumatic events including blunt and blast impacts, aircraft mishaps, motor vehicle crashes, sports-related injuries, falls, and protective equipment performance. She applies a multidisciplinary approach using experimental and computational methods, including surrogate modeling, image processing, and biomechanical analysis.

Prior to joining Exponent, Dr. Dávila-Montero was a National Science Foundation Graduate Research Fellow. She investigated injury thresholds for blast-induced traumatic brain injury using synthetic surrogates and in-vivo models, with a focus on gray–white matter interfaces and injury pathways. Her experience also includes evaluation of sport-related concussions, whiplash, and blunt-induced traumatic brain injury utilizing biomechanical evaluations, MRI-based imaging, and advanced material characterization techniques.

She has extensive experience in protective equipment evaluation, including work at the U.S. Department of the Navy's Helmet Systems and Auditory Performance Laboratory. There, she contributed to testing next-generation helmet systems for equipment compatibility, mass properties, windblast resistance, and snag hazards, as well as assessing the performance of custom-fit hearing protection. Additionally, she brings industry experience in mining and materials processing, where she supported machinery design and optimization in compliance with OSHA standards.

## Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Michigan State University, 2026

B.S., Mechanical Engineering, University of Puerto Rico, Mayagüez (UPRM), 2019

Graduate Research Fellowship (GRFP), National Science Foundation, 2022

University Enrichment Fellowship, Michigan State University, 2020

## Academic Appointments

Teaching Assistant, Mechanical Engineering Department, Michigan State University, 2021

## Prior Experience

Graduate Research Assistant, Michigan State University, 2020-2026

Naval Research Enterprise Internship Program Intern, Helmet Systems and Auditory Performance Laboratory, 2025

Design Engineer, Terex Corporation, 2020

Undergraduate Research Assistant, Mechanical Engineering Department, Michigan State University, 2019

Undergraduate Research Assistant, Biomedical Engineering Department, Michigan State University, 2018

## Professional Affiliations

Society for Experimental Mechanics

American Society of Mechanical Engineers

## Publications

Morales-Torres, G.L., Dávila-Montero, B., Colón-Santiago, L.A., Bin Yaacob, M.Y., Chakrapani, S.K., Sepúlveda, N. 2026. "[Assessment of a flexible, self-powered sensor under explosive blast loading](#)." Nano Trends. Vol 14. 100209.

Islam, S., Netzley, A., Li, C., Zhang, J., Dávila-Montero, B., Vazquez, A., Subbaiah, S., Meoded, A., Munoz, K., Colbath, A., Huang, J., Mejia-Alvarez, R., Manfredi, J., Pelled, G. 2025. "[Volumetric and Diffusion Tensor Imaging Abnormalities Are Associated With Behavioral Changes Post-Concussion in a Youth Pig Model of Mild Traumatic Brain Injury](#)." NMR in Biomedicine. Vol 38. N 7.

Morales-Torres, G., Gonzalez-Afanador, I., Davila-Montero, B., Pastrana, J., Dsouza, H., Sepulveda, N. 2023. "[Wireless, flexible, self-powered sensor to analyze head impact kinematics](#)." Nano Energy. 116. 108835.

Dsouza, H., Davila-Montero, B., Gonzalez-Afanador, I., Morales Torres, G., Cao, Y., Mejia-Alvarez, R., Sepúlveda, N. 2023. "[Measuring vibrations on a biofidelic brain using ferroelectric nanogenerator](#)." Scientific Reports. 13.

Dsouza, H., Pastrana, J., Figueroa, J., Gonzalez-Afanador, I., Davila-Montero, B., Sepúlveda, N. 2022. "[Flexible self-powered sensors for estimating human head kinematics relevant to concussions](#)." Scientific Reports. 12, 8567.

Kerwin, J., Yucesoy, A., Vidhate, S., Davila-Montero, B., Van Orman, J., Pence, T., Tartis, M., Mejia-Alvarez, R., and Willis, A. 2021. "[Sulcal Cavitation in Linear Head Acceleration: Possible Correlation with Chronic Traumatic Encephalopathy](#)." Frontiers in Neurology.

Mejia-Alvarez, R., Kerwin, J., Vidhate, S., Sandherr, P., Patton, E., Davila-Montero, B., Yucesoy, A., and Willis, A. 2021. "[Large Cross-Section Blast Chamber: Design and Experimental Characterization](#)." Measurement Science and Technology.

## Presentations

Dávila-Montero B, Yuan T, Manfredi J, Mejia-Alvarez R. Fascicular Tracking, Intracranial Cavitation, and Kinematics of Blast-induced TBI in Ovine Models. Oral presentation. Society for Experimental Mechanics

Annual Conference, Milwaukee, WI, 2025.

Dávila-Montero B, Mejia-Alvarez R. MRI Validation of the Anthropomorphic Neurologic Gyrencephalic Unified Standard (ANGUS) Phantom. Oral presentation. Society for Experimental Mechanics Annual Conference, Vancouver, WA, 2024.

Dávila-Montero B, Kerwin J, Yücesoy A, Vidhate S, Van Orman JL, Pence TJ, Tartis M, Mejía-Alvarez R, Willis, AM. Intracal Cavitation and Stress Concentration Consistent with Chronic Traumatic Encephalopathy. Oral presentation. Society for Experimental Mechanics Annual Conference, Orlando, FL, 2023.

Dávila-Montero B. Blunt Impact Kinematics in Human Head Phantoms. Military Health System Research Symposium. Oral presentation. Virtual. 2021.

Dávila-Montero B, Kerwin J, Mejía-Alvarez R. Utilizing a Human Head Surrogate to Study Traumatic Brain Injuries. Poster presentation. Annual Biomedical Research Conference for Minority Students, Anaheim, CA, 2019.

Dávila-Montero B, Bhattacharya S. Identifying Critical Transition States in Pancreatic Cells. Poster presentation. Emerging Research National Conference in STEM, Washington DC, 2019.

## Additional Education & Training

Professional and Practical Ethics Minor, University of Puerto Rico – Mayagüez Campus, 2020