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DAVID M. FORTENBAUGH, Ph.D., ASP
SENIOR MANAGING CONSULTANT

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Dr. Fortenbaugh is a consultant and project manager for matters related to product liability and premises safety. He has forensically investigated over 1,000 accidents, including over 250 falls following a slip, trip, or misstep. These investigations frequently incorporate biomechanical accident reconstruction and injury analyses. He also assesses the human factors/ergonomics issues of how products and systems are designed and how individuals interact with them and their environments. Dr. Fortenbaugh has extensive experience in multidisciplinary studies of incidents involving consumer and industrial products and routinely evaluates human interaction with sports, fitness, and recreational equipment, medical devices (e.g., wheelchairs and walkers), and climbing products (e.g., ladders and stepstools). He examines issues of workplace safety and human motion analysis including occupant kinematics.

In addition to applying his expertise to litigated matters, Dr. Fortenbaugh is often asked to consult on the development and revision of warnings and instructions for on-product labels, manuals, and other collateral materials. He is also active in the development of safety standards and has served in multiple leadership roles in professional societies.

Prior to joining ESi, Dr. Fortenbaugh worked extensively with athletes and medical professionals for over 10 years to improve human performance and reduce injury. His previous research focused on the biomechanical analysis of both basic and sports-specific movements, effectiveness of surgical techniques through cadaver testing, and clinical outcomes following orthopedic surgery. Dr. Fortenbaugh has presented his research findings at numerous national and international scientific conferences and has published more than a dozen peer-reviewed journal articles. He also contributes as a reviewer for such publications.

Areas of Specialization

Biomechanical Accident Reconstruction
Human Factors / Ergonomics
Sports and Fitness Equipment
Warnings, Instructions, and Safety Labeling
Medical and Mobility Devices
Slips, Trips, and Falls
Visibility and Conspicuity
Product Safety and Design
Injury Analysis
Industrial and Workplace Safety
Risk Assessment and Hazard Analysis

November 2024

Education

Ph.D., Ergonomics, University of Miami, 2011
M.S., Movement Science, Biomechanics Specialization, Barry University, 2005
B.S., Biomedical Engineering, Yale University, 2003

Positions Held

Engineering Systems Inc., Colorado Springs, Colorado & Fort Myers, Florida
Senior Managing Consultant (2023 – present)
Senior Consultant (2021 – 2023)
Senior Staff Consultant (2018 – 2021)
Staff Consultant (2014 – 2018)

Motus Global, Bradenton, Florida
Executive VP, Biomechanics Research and Development (2012 – 2013)

American Sports Medicine Institute, Birmingham, Alabama
Biomechanist (2007 – 2012)

Selected Technical Investigation Areas

Design and evaluation of on-product safety labels and owner's manuals
Ergonomic product design evaluation
Sports, fitness, and recreational equipment
Amusement park attractions, waterslides, and other recreational land and water sports
Medical and mobility devices (wheelchairs, walkers, etc.)
Worker and patient safety in healthcare facilities
Consumer products (household appliances, toys, lawnmowers, etc.)
Night-time visibility / conspicuity and visibility obstructions
Automotive human factors
Occupant protection in cars, heavy trucks, off-road vehicles, and construction equipment
Biomechanical / injury analysis of low-speed motor vehicle crashes
Infant and child products
Motorcycle and bicycle helmets
Pedestrian / vehicle and bicycle / vehicle crashes
Manual material handling
ADA / OSHA
Ladders, stairways, and falls from heights
Machine and furniture tip-overs
Hot liquid spills
Slips, trips, and missteps in various environments (retail, industrial, residential, etc.)

Continuing Education

eRailSafe Certification (2023)

Forklift Training, J.J. Keller (2022)

Walkway Auditor Certificate Holder (WACH), National Floor Safety Institute (2021)

Neuroradiology 101, AAAM (2021)

Preventing Falls in the Workplace, International Ergonomics Association (2021)

Child Safety: The New Decade and Beyond, AAAM (2021)

OSHA 30 Hour Outreach Training Program – Construction, 360 Training (2021)

Behind the Scenes Look at an IIHS Crash Test, AAAM (2020)

Recent Developments at the US CPSC, Sports and Fitness Industry Association (2019)

ADA Basic Building Blocks Course, ADA National Network (2019)

Human Factors in Traffic Crash Reconstruction, IPTM (2017)

Understanding Bloodstain Pattern Analysis, Bevel, Gardner & Associates (2017)

Certified XL Tribometrist (CXLT), Excel Tribometers, LLC (2016)

Course on Injury Scaling: Uses and Techniques, AAAM (2015)

Traffic Crash Reconstruction 1, Northwestern University (2014)

Professional Certifications/Affiliations/Honors

American Society for Testing and Materials (ASTM) International

Member, E17 – Vehicle – Pavement Systems (2024 – present)
Member, E34 – Occupational Health and Safety (2015 – present)
Member, F08 – Sports Equipment, Playing Surfaces and Facilities (2014 – present)
Member, F13 – Pedestrian/Walkway Safety and Footwear (2014 – present)
Member, F15 – Consumer Products (2018 – present)
Member, F24 – Amusement Rides and Devices (2019 – present)
Member, F25 – Ship and Marine Technology (2020 – 2021)
Member, F27 – Snow and Water Sports (2021 – present)

Association for the Advancement of Automotive Medicine (AAAM)
Chair, Policy Committee (2020 – 2023)
Vice Chair, Policy Committee (2019 – 2020)
Member, (2016 – present)

American National Standards Institute (ANSI)
Member, A14.5 Subcommittee on portable reinforced plastic ladders (2021 – present)
Member, A14.11 Subcommittee on stepstools (2021 – present)

American Orthopedic Society for Sports Medicine
O'Donoghue Sports Injury Research Award (2013)

American Society of Safety Professionals (ASSP)
Professional Member (2022 – present)

American Sports Medicine Fellowship Society
Clinical Science Award (2011)
Basic Science Award (2008, 2011)

Board of Certified Safety Professionals (BCSP)
Associate Safety Professional (2024-present)

Human Factors and Ergonomics Society (HFES)
President, University of Miami Chapter (2006 – 2007)
Member, (2016 – present)
Forensics Professional Technical Group Program Chair (2024-2025)
Reviewer

International Society of Biomechanics in Sports (ISBS)
Director (2009 – 2011)
Member (2004 – 2012)

Professional Activities

American Journal of Sports Medicine, Reviewer
International Journal of Industrial Ergonomics, Reviewer
International Journal of Sports Science & Coaching, Reviewer
Journal of Applied Biomechanics, Reviewer
Journal of Motor Behavior, Reviewer
Journal of Shoulder and Elbow Surgery, Reviewer
Journal of Sports Sciences, Reviewer
Perceptual and Motor Skills, Reviewer
PLOS ONE, Reviewer

Sports Biomechanics, Reviewer
Sports Health, Reviewer

ARC-CSI Crash Conference
Pedestrian Crash Research Team (2017)

Human Factors and Ergonomics Society
"Reducing Risk through Design" session chair (2017)

Publications/Presentations

An Integrated Approach to Visualizing a Nighttime Accident Scene for Human Factors Analysis. Aspire: The Annual Meeting of the Human Factors and Ergonomics Society, Phoenix, AZ, USA, September 13, 2024.

"Flip-Flops: A Survey of Risk Perception and Acceptance", **D. Fortenbaugh**, P. Shibata, M. Meza-Arroyo, K. Thobe and T. Welch. Proceedings of the Human Factors and Ergonomics Society, 2022.

Beyond the Horizon of Consumer Communications. ICPHSO International Virtual Symposium: The Safety Horizon: International Perspectives on the Future of Consumer Product Safety, 2021.

"A Methodology for Assessing Driver Perception-Response Time during Unanticipated Cross-Centerline Events", L. Riexinger and **D. Fortenbaugh**, Traffic Injury Prevention, 2021.

These Issues Will Get Your Heart Rate Up: Fitness Equipment. CLM Focus: Diversity & Inclusion, Product Liability, Transportation, Claims & Litigation, Webcast, June 25, 2020.

"Validation of the Han-Brach Vehicle-Pedestrian Impact Mechanics Model", R. M. Brach, **D. Fortenbaugh** and J. van Poppel, Collision Magazine, volume 13, issue 2, pgs. 8 – 23, Spring 2020.

"A Parametric Study of an Adaptive Load-Limiting Restraint System with Weight Sensing Considerations" J. van Poppel, A. Stern, **D. Fortenbaugh**, and G. Wilcox. 26th ESV, Eindhoven, Netherlands, 2019.

"Changes in Youth Baseball Pitching Biomechanics: A 7-Year Longitudinal Study" G. Fleisig, A. Diffendaffer, B. Ivey, K. Aune, T. Laughlin, **D. Fortenbaugh**, B. Bolt, W. Lucas, K. Moore and J. Dugas. American Journal of Sports Medicine, 2017.

"Long-Term Outcomes after Ulnar Collateral Ligament Reconstruction in Competitive Baseball Players: A Minimum of 10 Years Follow-up" D. Osbahr, L. Cain, **D. Fortenbaugh**, B. Raines, J. Dugas and J. Andrews. American Journal of Sports Medicine, 2014.

"Trunk Axial Rotation in Baseball Pitching and Batting" G. Fleisig, W. Hsu, **D. Fortenbaugh**, A. Cordover and J. Press. Sports Biomechanics, 2013.

"Dynamic Ultrasonography: A Cadaveric Model for Evaluating Aseptic Loosening of Total Ankle Arthroplasty" P. Ryan, **D. Fortenbaugh**, M. Downey and J. Kirchner. Journal of Foot and Ankle Surgery, 2013.

"Comparison of Back Squat Kinematics Between Barefoot and Shoe Conditions" K. Sato, **D. Fortenbaugh**, D. Hydock and G. Heise. International Journal of Sports Science and Coaching, 2013.

"Kinematic Changes Using Weightlifting Shoes on Barbell Back Squat" K. Sato, **D. Fortenbaugh** and D. Hydock. Journal of Strength and Conditioning Research, 2012.

Pathology of Baseball Pitching: Biomechanics and Epidemiology. Seventh Annual Coaches and Sport Science College, East Tennessee State University, USA, December 15, 2012.

"The Effect of Pitch Type on Ground Reaction Forces in the Baseball Swing" **D. Fortenbaugh**, G. Fleisig, A. Onar-Thomas and S. Asfour. Sports Biomechanics, 2011.

"Biomechanical Comparison of Baseball Pitching and Long-Toss: Implications for Training and Rehabilitation" G. Fleisig, B. Bolt, **D. Fortenbaugh**, K. Wilk and J. Andrews. Journal of Orthopedic and Sports Physical Therapy, 2011.

Elbow Biomechanics & Pathomechanics. ASMI Weekly Conference, Birmingham, AL, USA, September 2, 2011.

Coming Down: Throwing Mechanics of Baseball Catchers. ASMI Injuries in Baseball Course, Tampa, FL, USA, January 29, 2011.

Elbow Biomechanics & Pathomechanics in Pitching. ASMI Injuries in Baseball Course, Tampa, FL, USA, January 29, 2011.

Pitching Biomechanics and Epidemiology. Jefferson County High School Baseball Coaches Meeting, Kimberly, AL, USA, November 4, 2010.

Elbow Biomechanics & Pathomechanics. ASMI Weekly Conference, Birmingham, AL, USA, September 3, 2010.

Coming Down: Throwing Mechanics of Baseball Catchers. International Society of Biomechanics in Sport Conference, Marquette, MI, USA, July 22, 2010.

The Effects of Weightlifting Shoes on Squat Kinematics. International Society of Biomechanics in Sport Conference, Marquette, MI, USA, July 20, 2010.

Biomechanics of Baseball Batting. ASMI Injuries in Baseball Course, Birmingham, AL, USA, January 24, 2010.

Elbow Biomechanics & Pathomechanics in Pitching. ASMI Injuries in Baseball Course, Birmingham, AL, USA, January 23, 2010.

"Effects of the Bench Shirt on Sagittal Bar Path" T. Silver, **D. Fortenbaugh** and R. Williams. Journal of Strength and Conditioning Research, 2009.

"Baseball Pitching Biomechanics in Relation to Injury Risk and Performance" **D. Fortenbaugh**, G. Fleisig and J. Andrews. Sports Health: A Multidisciplinary Approach, 2009.

Elbow Biomechanics & Pathomechanics. ASMI Weekly Conference, Birmingham, AL, USA, September 28, 2009.

Mechanical Efficiency in Baseball Pitching. International Society of Biomechanics in Sport Conference, Limerick, Ireland, August 20, 2009.

Do Biomechanical Evaluations Help? ASMI Injuries in Baseball Course, Houston, TX, USA, January 25, 2009.

Elbow Biomechanics & Pathomechanics in Pitching. ASMI Injuries in Baseball Course, Houston, TX, USA, January 24, 2009.

Elbow Biomechanics & Pathomechanics. ASMI Weekly Conference, Birmingham, AL, USA, September 5, 2008.

Head Motion during Baseball Pitching. North American Congress on Biomechanics. Ann Arbor, MI, USA, August 8, 2008.

Ballpark Forces: Ground Reaction Forces During Batting. International Society of Biomechanics in Sport Conference. Seoul, South Korea, July 15, 2008.

Incorporating Dartfish into a Sports Camp. Southeastern Meeting of the American Society of Biomechanics. Birmingham, AL, USA, April 28, 2008.

The Biomechanics of Baseball Pitching: Shoulder & Elbow. Samford University, Birmingham, AL, USA, February 8, 2008.

"The Biomechanics of Situational Baseball: Execution and Perception of Left-Handed Pitchers' Simulated Pick-Off Moves to First Base" **D. Fortenbaugh** and M. Butcher-Mokha, Sports Biomechanics, 2007.

25 Years of the ISBS: A Silver Salute to Sports Biomechanics Presentations. International Society of Biomechanics in Sport Conference. Ouro Preto, Brazil, August 26, 2007.

Differences in Angular Velocity Among Selected Kinematics During a Left-Handed Pitchers' Pick-Off Move. International Society of Biomechanics in Sport Conference. Salzburg, Austria, July 15, 2006.

Selected Kinematic Comparisons Between Football Quarterbacks and Baseball Catchers at Maximum External Rotation of the Shoulder. Southeast Biomechanics Conference. Atlanta, GA, USA, April 1, 2006.

Deliveries to Home Plate and First Base Made by Left-Handed Pitchers. International Society of Biomechanics in Sport Conference. Ottawa, Canada, August 10, 2004.

Patents

United States Patent:
Patent No. 10,314,536
Patent Tile: Method and system for delivering biomechanical feedback to human and object motion