



BACKGROUND

Dr. Howard earned a Bachelor of Science degree in Kinesiology (Strength and Conditioning Specialization) from the University of Wisconsin Oshkosh and a Master of Science degree in Human Performance (Applied Sport Science Specialization) from the University of Wisconsin La Crosse. He continued his studies with a Ph.D. degree in Kinesiology (Motor Control, Biomechanics Specialization) with a minor in Applied Statistics from the Louisiana State University.

His scientific research has focused on the effects of nervous system alterations on neuromotor control. Dr. Howard's graduate study focused on studying movement variability and its nuance role in motor performance regarding upper body reaching tasks in physical and virtual reality (VR) environments. His research included, 3-D motion analysis, electromyography, musculoskeletal modeling, metabolic testing, non-linear time series analysis, and athlete testing. Dr. Howard has completed advanced coursework in the field of biomechanics, exercise physiology, nutrition, neuromotor control, motor learning, mathematics, and statistics.

During the final year of his Ph.D., Dr. Howard worked as a contracted Research Associate at Google specializing in Augment Reality User Experience Research (AR UX), where he conducted qualitative and quantitative human factors research. After his contract work at Google and graduating from LSU, Dr. Howard worked as a Post-Doctoral Research Associate at Old Dominion University. Dr. Howard's post-doctoral research focused on neuromotor performance post brain impacts, focusing on how repetitive sub-concussive blast events impact neuromotor performance in military personnel. Additionally, Dr. Howard worked on multidisciplinary research projects with the Old Dominion University school of rehabilitation focusing on fall risks in older adults, gait kinematics in young and older adults, VR concussion testing validation, and athlete concussion testing.

Dr. Howard has specialized in several research areas focusing on studying all facets of human movement, injury, and performance, in addition to human factors and code compliance. Overall Dr. Howard's expertise spans several avenues, including, but not limited to gait analysis, strength and conditioning, human performance, upper body human movement, postural control, injury mechanisms, injury biomechanics, human reaction, human factors, human movement variability, action perception, slip resistance testing, and applicable code compliance. Dr. Howard has published in the area of human movement and exercise physiology. Dr. Howard continues his education development through multiple professional societies.

Dr. Howard also specializes in the analysis of running biomechanics with his extensive running experience. He has over 15 years of running experience including competitive running, collegiate cross country, collegiate track & field, fitness/recreational, and coaching.

AREAS OF EXPERTISE

- Human Kinematic Analysis and Testing
- Joint Biomechanics
- Sport Biomechanics
- Injury Causation Biomechanics
- Human Factors
- Gait Analysis
- Building Codes Compliance and Standards
- Statistical Analysis
- Slip/Trip/Fall Kinematics and Kinetics
- Non-linear Time Series Analysis
- Strength and Conditioning
- Running Kinematics and Kinetics

CERTIFICATIONS

- Certified Strength and Conditioning Specialist (CSCS), 2019 - present
- Certified Performance & Sport Scientist (CPSS) (pending)
- Tactical Strength & Conditioning (TSAC) (pending)

EDUCATION

- PhD in Kinesiology (Motor Control, Biomechanics Specialization), Louisiana State University, 2019 --2023
 - Minor: Applied Statistics
 - Academic Supervisor: Dr. Arend W. A. Van Gemmert
 - Research Supervisor: Dr. Nikita A. Kuznetsov
 - Dissertation Title: "Attentional focus effects on motor variability"
- Master of Science in Human Performance (Applied Sport Science Specialization), University of Wisconsin La Crosse, 2017 – 2019
 - Supervisor: Dr. Attila J. Kovacs
 - Thesis Title: "Effects of attentional focus on dynamic whole-body movements as a function of skill level"
- Bachelor of Science in Kinesiology (Strength and Conditioning Specialization), University of Wisconsin Oshkosh, 2014 – 2017

PROFESSIONAL EXPERIENCE

July 2024 – Present | ARCCA, LLC | Senior Biomechanist

- Applies the principles of human factors and biomechanics to the anatomy and physiology of the human body to explore the cause, nature, and severity of injuries.
- Performs analysis of building codes associated with personal injuries and premises liability Building Codes and Standards.
- Provides instruction in the area of human factors, and biomechanical and injury causation analysis.

June 2023 – June 2024 | College of Health Sciences, Old Dominion University | Post-doctoral Researcher

November 2022 – December 2022 | Magnit @ Google | Google AR UX Research Associate

January 2021 – December 2022 | Louisiana State University | Adjunct Graduate Teaching Assistant

August 2020 – November 2022 | Louisiana State University | Graduate School Graduate Assistant

RESEARCH EXPERIENCE

Postdoctoral Researcher – Old Dominion University 06/2023 – 06/2024

(Supervisor: *Dr. Christopher Rhea*)

- Responsibilities include managing the day-to-day aspects of the Department of Defense funded INVICTA project that is focused on studying repetitive sub-concussive blast exposure effects on military personnel. Duties include data management, analysis, and dissemination for the neuromotor component of INVICTA. I am also exploring related scientific interests, including blunt trauma events on neuromotor performance across diverse age groups within the soccer

community, performing a secondary data analysis on mobility and clinical metrics from large older adult cohort who had elevated fall-risk, contributing to systematic review and survey-based manuscripts focused on the use of virtual reality in clinical settings, and investigating the effects of attentional focus on movement variability in upper body movements and postural control across varying levels of functional difficulties.

AR UX Research Associate – Google 11/2022 – 06-2023

(Supervisor: Dr. Justin Munafo)

- Spearheaded pioneering research initiatives in augmented reality, with a particular emphasis on advancing computer vision and optimizing human-computer interaction. Collaborated closely with diverse teams, I developed and prototyped innovative AR functionalities and applications for integration across Google's platforms, thereby contributing to the forefront of AR technology and elevating user experiences within Google's suite of products and services.

PhD Candidate – Louisiana State University 06/2019 – 05/2023

(Supervisor: Dr. Nikita A. Kuznetsov)

- Explored the impact of attentional focus on movement variability during an upper body reaching task, with a specific emphasis on analyzing joint coordination using the uncontrolled manifold hypothesis. Additionally, examined handedness differences through dynamic dominance theory. Conducted a supplementary research project investigating the interaction between rhythmic and discrete movement, with a focus on the roles of event and emergent timing.

Master's Thesis –University of Wisconsin La Crosse 08/2017 – 05/2019

(Supervisor: Dr. Attila J. Kovacs)

- Investigated the effects of attentional focus on dynamic whole-body movements as a function of skill level, particularly assessing how external focus (EF) influences the performance of a sprint start by examining its impact on premotor reactions and whether this influence varies depending on participants' skill level.

Research Assistant –University of Wisconsin La Crosse 08/2017 – 05/2019

(Supervisor: Garrett Fontaine & Dr. Attila J. Kovacs)

- Contributed to setting up data collection, executing procedures, and assisting with data management for future analysis as part of my involvement in a student's master's thesis.

PROFESSIONAL PAPERS & PRESENTATIONS

Manuscripts Published

1. **Howard, C.K.**, Van Gemmert, A.W.A., Kuznetsov, N.A. (2023). Attentional focus effects on joint covariation in a reaching task. *Human Movement Science*, 89, 1-13.
2. Salzgeber, A., Porcari, J.P., **Howard, C.K.**, Arney, B.E., Kovacs, A.J., Gillette, C., & Foster, C. (2019). Muscle Activation during Several Battel Rope Exercises, *International Journal of Research in Exercise Physiology*, 14(2),1-10.

Manuscripts in Review

1. Felsberg, D., McGuirt, J., Ross., Raisbeck, L., **Howard, C.K.**, Rhea, C.K. Current Perspectives on virtual reality use in physical therapy practice.
2. **Howard, C.K.**, Yamada, M., Dovel, M., Magee, E., Brooks, D., Lausted, C., Neilson, G., Fajimi, A., Lee, D., Keyser, D.O., Carr, W., Hernandez, R.S., Rowe, S., Roy, M.J., Rhea, C.K. An objective assessment of neuromotor control after repeated sub-concussive blast exposure: Preliminary data from the INVICTA Study.

3. Felsberg, D., Ross, S., Raisbeck, L., McGuirt, J., **Howard, C.K.**, Pousti, R., Rhea, C.K. The current landscape of virtual reality use in physical rehabilitation: A systematic Review.

Manuscripts in Development

1. **Howard, C.K.**, Gheidi, N., Mikat, R., & Kovacs, A.J. Effects of attentional focus on dynamic whole-body movements as a function of skill level.
2. **Howard, C.K.**, Van Gemmert, A.W.A., & Kuznetsov, N.A. Attentional focus effects on joint covariation in virtual reality reaching task.

Conference Abstracts & Presentations

1. Rhea, C.K., **Howard, C.K.**, Dovel, M., Toxey, J., Leverett, R., Hill, A., Keyser, D.O., Hernandez, R.S., Rowe, S., Gonzales, A., Wiri, S., Carr, W., & Roy, M.J. (under review). Subconcussive blasts—regardless of magnitude—lead to a decline in neuromotor performance: Data from the INVICTA Study. *Military Health System Research Symposium*. Kissimmee, FL.
2. Langherhans, K., **Howard, C.K.**, Moxey, J., Samulski, B.S. (June 2024). The Correlation of a Physiological Profile Assessment, Fall-risk Index and Gait Parameters of Community Dwelling, Older Adults. Poster presented at the *North American Society for the Psychology of Sport and Physical Activity*, New Orleans, LA.
3. Pousti, G., **Howard, C.K.**, Ross, S.E., Raisbeck, L.D., McGuirt, J.T., Rhea, C.K., Felsberg, D.T. (June 2024). The current landscape of virtual reality use in physical rehabilitation: A systematic review. Poster presented at the *North American Society for the Psychology of Sport and Physical Activity*, New Orleans, LA.
4. **Howard, C.K.**, Dovel, M., Toxey, J., Leverett, R., Hill, A., Keyser, D.O., Carr, W., Hernandez, R.S., Rowe, S., Gonzales, A., Wiri, S., Roy, M.J., Rhea, C.K. (June 2024). Neuromotor performance is influenced by blast magnitude in military personnel. Podium presented at the *North American Society for the Psychology of Sport and Physical Activity*, New Orleans, LA.
5. Rhea, C.K., **Howard, C.K.**, Yamada, M., Dovel, M., Magee, E., Brooks, D., Lausted, C., Nelson, G., Fajimi, A., Lee, D., Wiri, S., Keyser, D.O., Carr, W., Hernandez, R.S., Rowe, S., Roy, M.J. (March 2024). Association between sub concussive blast exposure characteristics and neuromotor function. Podium presented at the *Society for Brain Mapping and Therapeutics Annual Congress*, Los Angeles, CA.
6. **Howard, C. K.**, Van Gemmert, A. W. A., & Kuznetsov, N. A. (June 2022). Attentional focus effects on movement variability in a virtual reality reaching task. Podium presented at the *North American Society for the Psychology of Sport and Physical Activity*, Waikoloa, HI.
7. **Howard, C.K.**, & Kuznetsov, N.A. (May 2022). Attentional focus effects on joint covariation in a reaching task. Podium presented at *Human Movement Variability*, Omaha, NE.
8. **Howard, C. K.**, & Kuznetsov, N. A. (July 2021). Attentional focus effects on joint covariation in a reaching task. Podium presented at the *North American Society for the Psychology of Sport and Physical Activity*, New Orleans, LA.
9. **Howard, C. K.**, & Kuznetsov, N. A. (May 2020). Interaction between rhythmic and discrete movement; Role of event and emergent timing. Podium presented at the *North American Society for the Psychology of Sport and Physical Activity*, Vancouver, British Columbia, Canada.
10. **Howard, C. K.**, & Kovacs, A. J. (July 2019). Effects of attentional focus on dynamic whole-body movements as a function of skill level. Podium presented at the *North American Society for the Psychology of Sport and Physical Activity*, Baltimore, MD.

ADDITIONAL EXPERIENCE

Teaching Experience

Old Dominion University

PT 628 – Theory of Practice II, 04/2024

(~20 students)

- *Guest Lecturer:* Guide first-year physical therapy students through advanced exercise prescription and execution in rehabilitation. Discuss theoretical foundations, clinical methodologies, and empirical support for designing personalized exercise plans. Topics include specialized protocols for different conditions, biomechanical principles, and strategies for enhancing functional outcomes.

PT 810 - Scientific Inquiry 1, 11/2023

(~20 students)

- *Guest Lecturer:* Guide second year physical therapy students through introductory statistical theories and analysis methods. Topics included t-tests, paired t-test, regression, ANOVA, MANOVA, correlation, error types, hierarchical testing.

Louisiana State University

Kinesiology 3513 – Introduction to Motor Learning, 08/2022 – 12/2022

(~50 students)

- *Instructor of Record:* Prepared and gave lectures to introduce students to the general overview of theory, research, and practice in motor learning. Topics included processing information and making decisions, attention and performance, sensory contributions to skilled performance, motor programs, complex movements, skill learning, scheduled practice, and principles of speed, accuracy, and timing.

Kinesiology 4571 - Neuromotor Control of Human Movement, 01/2022 – 05/2022

(~20 students)

- *Instructor of Record:* Prepared and gave lectures to students to learn about the neural aspects of human movement. Topics included neuroanatomy, voluntary/involuntary motor control, clinical applications, muscle dynamics, sensory and motor neural pathways, subcortical reflexes, supraspinal mechanisms, and behavioral issues.

ACE Personal Training Certification Course, 06/2021 – 07/2022

LSU University Recreation Center (~10 students)

- *Co-Instructor of Record:* Led future personal trainers through a curriculum that provided a clear understanding of creating safe and effective physiological adaptations through energy system development, basic nutrition, and resistance training.

Kinesiology 3514 – Biomechanics Basics, 11/2021

(~30 students)

- *Guest Lecturer:* Facilitated student understanding of torque, forces, inertia, friction, and levers, with practical applications pertaining to weightlifting.

Kinesiology 3513– Introduction Motor Learning, 10/2021
 (~50 students)

- *Guest Lecturer - Lab:* Guided students through an interactive lab to demonstrate the difference between temporary and more permanent effects of practice. Responsibilities encompassed guiding students through instructions, imparting findings to them, addressing inquiries, and evaluating lab submissions.

Kinesiology 1999– Strength and Conditioning, 06/2020 – 08/2020
 (~20 students)

- *Instructor of Record:* Prepared and gave lectures to introduce and supplement the principles of aerobic conditioning, self-fitness evaluation, nutrition, weight control, flexibility, strength, and cardiovascular risk factors.

Kinesiology 1125– Beginners Golf, 01/2020 – 05/2020
 (~60 students)

- *Instructor of Record:* Prepared and gave lectures to introduce the fundamentals of golf. Topics included etiquette, scoring, putting, chipping, style of clubs, biomechanical principles of the golf swing, pitching, and driving. Additional responsibilities included form correction while practicing, live demonstrations, and creation of applied exams to show skill development.

Kinesiology 1124– Beginners Tennis, 08/2019 – 12/2019
 (~60 students)

- *Instructor of Record:* Prepared and gave lectures to introduce the principles of aerobic conditioning, technique, and games rules/etiquettes in tennis. Additional responsibilities included form correction while practicing, live demonstrations, and creation of applied exams to show skill development.

PROFESSIONAL MEMBERSHIPS

- National Strength and Conditioning Association (NSCA), 2014 – Present
- North American society for Psychology of Sport and Physical Activity, 2019 – Present
- International Society of Biomechanics, 2024 – Present

PROFESSIONAL COURSES

Old Dominion University

Biomedical Research – Basic/Refresher (exp. 2025)

Biomedical Responsible Conduct of Research

Datacamp

Associate Data Scientist in R (15/22 completed)

Introduction to Statistics R

WORKSHOPS ATTENDED / ATTENDING

- Virginia State Clinic – National Strength and Conditioning Association, 02/2024
- Annual Nonlinear Analysis Workshop – University of Omaha Nebraska, 06/2022
- Motor Control Summer School (MCSS-XIX) – Pennsylvania State University, 07/2022
- Louisiana State Clinic – National Strength and Conditioning Association, 10/2020
- Wisconsin State Clinic – National Strength and Conditioning Association, 04/2019
- Wisconsin State Clinic – National Strength and Conditioning Association, 04/2017

SKILLS & TECHNIQUES

Lab/Hardware

- Motion Capture (Vicon & Qualisys), Surface Electromyography (Delsys), Visual 3D, Virtual Reality (Oculus Rift), Bertec Dual Belt Treadmill, Biodex, Anthropometry Set, AMTI force plates, Motek, Zephyr performance systems, Brower Timing Systems, Inertial Measurement Unit (IMU), ADPM Full Body OPAL Sensors, Dynamometers

Software

- Matlab, SPSS, Visual 3D, SAS, MS Office Suite, OpenSim 4.1, R/Rstudio, Unity, Python (limited), C++, JavaScript (limited), WonderShare Filamore, Android Studio

SERVICES

Volunteer (Judge – Virginia State Science & Engineering), 04/2024

- Judged projects at the Virginia State Science & Engineering Fair, assessing scientific method, creativity, and presentation quality. Served as a Grand Award Judge, selecting top-performing projects for prestigious honors. Specialized as an APA Specialty Judge, offering expertise in psychology and behavioral sciences to evaluate projects in those fields.

Volunteer (Journal Reviewer – Journal of Motor Behavior), 07/2023 – present

- Evaluate submitted manuscripts for originality, quality, and adherence to journals scope of research. Offered authors constructive feedback aimed at maintaining research quality while fostering future development and improvement.

Volunteer (Journal Reviewer – Human Movement Science), 05/2023 – present

- Evaluate submitted manuscripts for originality, quality, and adherence to journals scope of research. Offered authors constructive feedback aimed at maintaining research quality while fostering future development and improvement.

Volunteer (Graduate School Recruiting Event)

Louisiana State University, Baton Rouge, LA, (Fall, Spring) 2021 – 2023

- Attracted prospective students to LSU by offering comprehensive information on all graduate programs, while also providing resources to explore student life and future opportunities within the LSU community.

Volunteer (Biomechanics Search Committee), 10/2021 – 04/2022

Louisiana State University, Baton Rouge, LA

- Contributed to the recruitment process for the tenure-track biomechanics position by aiding in candidate search and actively engaging in on-campus interviews for final selection.

Volunteer (Biomechanics Undergraduate Course), 01/2018 – 05/2019

University of Wisconsin La Crosse, La Crosse, WI

- Displayed lab equipment and informed new undergraduate students of the applicability of kinesiology and kinesiology research.

ADDITIONAL RUNNING & ATHLETIC EXPERIENCE

Collegiate Athlete University of Wisconsin Oshkosh

- Cross Country National Qualifier, Men's Division III,
- US Cross Country All Academic Division III – 2014, 2015, 2016
- Cross Country All Regional – 2015
- Track and Field, Steeple Chase, All Conference Finisher - 2016
- Wisconsin intercollegiate Athletic Conference (WIAC) Max Sparer, Scholar Athlete Award – 2016
- Cross Country All Conference Finisher – 2015, 2016
- Cross Country All Regional Finisher – 2015

High School – Gaylord High School, MI

- Cross Country State Qualifier – 2009,2010,2011,2012
- Cross Country All State – 2012
- Cross Country All State Academic – 2009,2010,2011,2012
- Cross Country All State Academic Team Champion – 2012
- Cross Country All Regional Finisher – 2010,2011,2012
- Cross Country All Conference Finisher – 2010,2011,2012
- Cross Country Individual Conference Champion, Big North Conference – 2012