

JOSHUA C. CARR

Curriculum Vitae

joshuacarr@ksu.edu

Orcid ID: 0000-0003-0874-0110

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Education

Exercise Physiology University of Oklahoma	Ph.D.	<i>May 2019</i>
Exercise Physiology University of Oklahoma	M.S.	<i>May 2015</i>
Health & Exercise Science University of Oklahoma	B.S.	<i>May 2013</i>

Academic Appointments

2024 – Present	Kansas State University Department of Kinesiology <i>Assistant Professor</i> <i>Director, Neuromuscular Physiology Laboratory</i>	Manhattan, KS
2020 – 2024	Texas Christian University Department of Kinesiology <i>Assistant Professor</i> <i>Director, Neuromuscular Physiology Laboratory</i>	Fort Worth, TX
2020 – Present	Texas Christian University School of Medicine Department of Medical Education <i>Assistant Professor</i>	Fort Worth, TX
2021 – 2024	University of Central Florida School of Kinesiology & Physical Therapy <i>Graduate Adjunct Faculty</i>	Orlando, FL
2019 – 2020	Southern Utah University Department of Kinesiology <i>Assistant Professor</i>	Cedar City, UT

Awards & Honors

Young Investigator of the Year Award Nominee – *National Strength and Conditioning Association, 2025*

Educator of the Year Award Nominee – *National Strength and Conditioning Association, 2023*

BIGXII Faculty Fellowship Award – *Texas Christian University, 2022*

Educator Influencer Award – *Southern Utah University, 2020*

Provost's Certificate of Distinction in Teaching – *University of Oklahoma, 2019*

Graduate Student Writing Award – *American Kinesiology Association, 2019*

Travis Beck Memorial Scholarship Award – *University of Oklahoma, 2018*

Challenge Scholarship – *National Strength and Conditioning Association, 2017*

Teaching Experience

Kansas State University

KIN 603	Cardiovascular Physiology
KIN 605	Endocrinology in Health and Disease
KIN 607	Muscle Physiology
KIN 609	Environmental Physiology

Texas Christian University

*Served as the departmental NSCA Education Recognition Program Director; *Newly developed course.*

KINE 30003	Junior Honors Research
HLTH 30233	Sport and Exercise Pharmacology
HLTH 30233	Sport and Exercise Neurophysiology
KINE 30523	Exercise Assessment and Prescription
KINE 40523	Principles of Strength & Conditioning
KINE 40543	Advanced Strength & Conditioning
KINE 40003	Senior Honors Research
KINE 40780	Senior Research in Kinesiology
KINE 60613	Physiology of Exercise
KINE 60623	Cardiopulmonary Physiology

Texas Christian University School of Medicine

SOM 60030	Exercise as Medicine
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Southern Utah University

PE 3050	Motor Learning
PE 4010	Methods of Sports Conditioning
PE 4020	Research Methods and Statistics in Exercise Science
PE 4040	Exercise Testing and Prescription
PE 6040	Designing Resistance Training Programs

University of Oklahoma

HES 1823	Scientific Principles of Health and Disease
HES 3818	Principles of Health and Fitness
HES 4833	Physiology of Exercise Physiology Laboratory

Research Experience & Appointments

Director, Neuromuscular Physiology Laboratory

Department of Kinesiology, Kansas State University

2024 – Present

Director, Neuromuscular Physiology Laboratory

Department of Kinesiology, Texas Christian University

2020 - 2024

BIGXII Faculty Fellow

Texas Christian University & Oklahoma State University

Summer, 2022

Doctoral Research Assistant

Department of Health & Exercise Science, University of Oklahoma

Neuromuscular Laboratory, Director: Dr. Michael G. Bembien

2017 – 2019

Doctoral Research Assistant

Biophysics Laboratory, Director: Dr. Travis W. Beck

2015 - 2017

Master's Research Assistant

2013-2015

Scholarly Work and Contributions

Peer-Reviewed Journal Publications

Published

Original Research

1. Fasih M, Voskuil CC, Rivas CA, Lee BJ, Nadolny CC, Dietrich LN, **Carr JC**. Rectus femoris and vastus intermedius muscle asymmetries following ACL reconstruction. *International Journal of Sports Medicine*. 2025.
2. **Carr JC**, Voskuil CC, Andrushko JW, MacLennan RJ, DeFreitas JM, Stock MS, Farthing JP. Cross-education attenuates muscle weakness and facilitates strength recovery after orthopedic immobilization in females: A pilot study. *Physiological Reports*. 2025.
3. Anderson OA, Redinger AL, Mintz EL, Voskuil CC, Mogonye JA, Baker BS, **Carr JC**. Musculoskeletal tissue asymmetries following anterior cruciate ligament reconstruction. *JOSPT Open*. 2025.
4. Harmon KK, Girts RM, Rodriguez G, Beausejour JP, Pagan JI, **Carr JC**, Garcia J, Roberts MD, Hahs-Vaughn DL, Stout JR, Fukuda DH, Stock MS. Combined action observation and mental imagery vs. neuromuscular electrical stimulation as novel therapeutics during short-term knee joint immobilization. *Experimental Physiology*. 2024.

5. Voskuil CC, Dudar MD, **Carr JC**. Sex differences in fatiguability during single-joint resistance exercise in a resistance-trained population. *European Journal of Applied Physiology*. 2024.
6. Voskuil CC, Dudar MD, **Carr JC**. Exploring the relationship between ultrasonographic measures of the quadriceps and knee extensor muscle fitness in recreational endurance athletes. *Translational Sports Medicine*. 2024.
7. Girts RM, Harmon KK, Rodriguez G, Beausejour JP, Pagan JI, **Carr JC**, Garcia J, Stout JR, Fukuda DH, Stock MS. Sex differences in muscle quality recovery following one week of knee joint immobilization and subsequent retraining. *Applied Physiology, Nutrition, and Metabolism*. 2024.
8. MacLennan RJ, Hernandez-Sarabia J, Reese SM, Shields JE, Smith CM, Stute K, Collyar J, Olmos AA, Danielson TL, MacLennan DL, Pagan JI, Girts RM, Harmon KK, Coker N, **Carr JC**, Ye X, Perry JW, Stock MS, DeFreitas JM. fNIRS is capable of distinguishing laterality of lower body contractions. *Experimental Brain Research*. 2024.
9. **Carr JC**, King AC. Sex differences in the fractal dynamics of force control during maximal handgrip. *Neuroscience Letters*. 2024.
10. Parsowith EJ, Girts RM, Harmon KK, Pagan JI, Rodriguez G, Beausejour JP, **Carr JC**, Stock MS. The influence of resistance training experience on acute improvements in corticospinal excitability following mental imagery. *Brain Sciences*. 2024.
11. Watts CR, Thijs Z, King A, **Carr JC**, Porter R. A pilot study of the effect of a non-contact boxing exercise intervention on respiratory pressure and phonation aerodynamics in people with Parkinson's disease. *Journal of Clinical Medicine*. 2023.
12. Voskuil CC, Dudar MD, Zhang Y, **Carr JC**. Skeletal muscle ultrasonography and muscle fitness relationships: Effects of scanning plane and echogenicity correction. *Muscles*. 2023.
13. Pagan JI, Harmon KK, Girts RG, MacLennan RJ, Beausejour JP, Hernandez-Sarabia JA, Coker NA, **Carr JC**, Ye X, DeFreitas JM, Stock MS. Sex-specific reliability of lower limb corticospinal excitability and silent periods. *Journal of Strength and Conditioning Research*. 2022.
14. Augsburger GR, Soloveva A, **Carr JC**. Sex comparisons of neuromuscular function in the morning versus the evening. *Physiological Reports*. 2022.
15. **Carr JC**, Gerstner GR, Voskuil CC, Harden JE, Dunnick D, Badillo KM, Pagan JI, Harmon KK, Girts RM, Beausejour JP, Stock MS. The influence of sonographer experience on skeletal muscle image acquisition and analysis. *Journal of Functional Morphology and Kinesiology*. 2021.
16. **Carr JC**, Bemben MG, Stock MS, DeFreitas JM. Ipsilateral and contralateral responses following unimanual fatigue with and without illusionary mirror visual feedback. *Journal of Neurophysiology*. 2021.
17. **Carr JC**, Ye X, Tharp HT. Biceps brachii muscle length affects force steadiness with and without fatigue. *Journal of Science in Sport and Exercise*. 2021.

18. **Carr JC**, Bemben MG, Black CD, Ye X, DeFreitas JM. Bilateral deficit in strength but not rapid force during maximal handgrip contractions. *European Journal of Sports Science*. 2021.
19. **Carr JC**, Ye X. Strength and EMG responses of upper and lower limbs during maximal intermittent contractions in males and females. *Journal of Strength and Conditioning*. 2020.
20. **Carr JC**, Ye X, Stock MS, Bemben MG, DeFreitas JM. The time course of cross-education during short-term isometric strength training. *European Journal of Applied Physiology*. 2019.
21. **Carr JC**, Stock MS, Hernandez JM, Ortegon JR, Mota JA. Additional insight into biarticular muscle function: The influence of hip flexor fatigue on rectus femoris activity at the knee. *Journal of Electromyography and Kinesiology*. 2018.
22. **Carr JC**, Beck TW, Ye X, Wages NP. Mechanomyographic responses for the biceps brachii are associated with failure times during isometric force tasks. *Physiological Reports*. 2018.
23. **Carr JC**, Beck TW, Ye X, Wages NP. Intensity-dependent EMG response for the biceps brachii during sustained maximal and submaximal isometric contractions. *European Journal of Applied Physiology*. 2016.
24. **Carr JC**, Beck TW, Ye X, Wages NP. An examination of fatigue index and velocity-related force loss for the forearm flexors. *Journal of Strength and Conditioning Research*. 2015.
25. Ye X, Miller WM, Jeon S, **Carr JC**. Sex comparisons of the bilateral deficit in proximal and distal upper body limb muscles. *Human Movement Science*. 2019.
26. Ye X, Beck TW, Wages NP, **Carr JC**. Sex comparisons of non-local muscle fatigue in human elbow flexors and knee extensors. *Journal of Musculoskeletal and Neuronal Interactions*. 2018.
27. Wages NP, Beck TW, Ye X, **Carr JC**, Tharp HT. Unilateral fatiguing exercise and its effect on ipsilateral and contralateral resting mechanomyographic mean frequency between aerobic populations. *Physiological Reports*. 2017.
28. Beck TW, Ye X, Wages NP, **Carr JC**. Cross-spectral analysis of the force and surface electromyographic signals for examining steadiness following different exercise interventions. *Biomedical Physics & Engineering Express*. 2016.
29. Beck TW, Ye X, Wages NP, **Carr JC**, Tharp HM. Frequency-specific coherence in surface electromyographic signals from the vastus lateralis and vastus medialis. *Clinical Kinesiology*. 2016.
30. Wages NP, Beck TW, Ye X, **Carr JC**. Examination of a neural cross-over effect using resting mechanomyographic mean frequency from the vastus lateralis muscle in different resting positions following aerobic exercise. *European Journal of Applied Physiology*. 2016.
31. Wages NP, Beck TW, Ye X, **Carr JC**, Miller CA. Resting mechanomyographic amplitude from the vastus lateralis muscle in different postural resting positions following aerobic exercise. *Journal of Musculoskeletal Research*. 2015.

32. Voskuil CC, Andrushko JW, Huddleston BS, Farthing JP, **Carr JC**. Exercise prescription and strategies to promote the cross-education of strength: A scoping review. *Applied Physiology, Nutrition, and Metabolism*. 2023.

Editorials

33. **Carr JC**. A steady interest of analytical approaches to quantify skeletal muscle force control. *Journal of Applied Physiology*. 2024.
34. Andrushko JW, **Carr JC**, Farthing JP, Lepley LK, DeFreitas J, Goodall S, Hendy AM, Howatson G, Grooms DR, Zult T, Hortobágyi T, Harput G, Papandreu MG, Nosaka K, Carson RG, Manca A, Deriu F, Behm DG, Kidgell DJ, Clark NC, Boyd LA. The potential role of cross-education in early-stage rehabilitation after anterior cruciate ligament reconstruction. *British Journal of Sports Medicine*. 2024.
35. Andrushko JW, **Carr JC**, Farthing JP, Lepley LK, Goodall S, Hendy AM, Howatson G, DeFreitas J, Grooms DR, Zult T, Hortobágyi T, Harput G, Papandreu MG, Nosaka K, Carson RG, Manca A, Deriu F, Behm DG, Kidgell DJ, Boyd LA. Expression of concern over the Aspetar consensus for rehabilitation after ACL reconstruction: Premature position on the efficacy of cross-education. *Rapid Response, British Journal of Sports Medicine*. 2023.

Published Abstracts

Selected

Student Abstracts

- Bauerlein HM, Stambaugh KE, Edwards MF, Parsowith EJ, **Carr JC**, Smith-Ryan AE, Stock MS, Richardson, RM. The influence of oral contraceptives on grip strength during wrist/hand immobilization. Poster presentation at CSM 2025 - Combined Sections Meeting of the American Physical Therapy Association, Houston, TX, February 13-15, 2025.
- Richardson RM, Bauerlein HM, Stambaugh KE, Edwards MF, Parsowith EJ, **Carr JC**, Smith-Ryan AE, Stock MS. The influence of oral contraceptives on rehabilitation following wrist/hand immobilization. Poster presentation at American College of Sports Medicine Annual Meeting, Atlanta GA, May 28th, 2025.
- "The Effects of Mirror Illusion and Contraction Type on Interhemispheric Inhibition." Reese SM, Smith CM, Shields JE, Olmos AA, Voskuil CC, Ye X, Stock MS, **Carr JC**, DeFreitas JM. Neuroscience 2023, Washington D.C.
- "The Prevalence of an Ipsilateral Silent Period as a Measure of Interhemispheric Inhibition During Mirror Illusion." Smith CM, Reese SM, Shields JE, Olmos AA, Voskuil CC, Ye X, Stock MS, Carr JC, DeFreitas JM. Neuroscience 2023, Washington D.C.
- "Sex differences in fatiguability during resistance exercise in a resistance trained population" (2023). Voskuil CC, Dudar MD, Zhang Y, **Carr JC**. *Journal of Strength & Conditioning Supplement*. Poster Presentation at the National Strength and Conditioning Association National Conference, 2023, Las Vegas, NV.

- "Influence of Scanning Plane and Echo Intensity Correction on Relationships Between Muscle Size and Fitness." Voskuil CC, Dudar MD, Zhang Y, **Carr JC**. (2023). *Medicine & Science in Sports & Exercise Supplement*.
- "The capability of fNIRS brain imaging to discern hemispheric laterality during lower-body contractions." MacLennan RJ, Hernandez-Sarabia J, Reese SM, Shields JE, Smith CM, Stute K, Collyar J, Olmos AA, Danielson TL, MacLennan DL, Pagan JI, Girts RM, Harmon KK, Coker N, **Carr JC**, Ye X, Perry JW, Stock MS, DeFreitas JM. *Medicine & Science in Sports & Exercise Supplement*.
- "Sensitivity of FNIRS Brain Imaging To Determine Hemispheric Laterality During Lower-body Motor Tasks." MacLennan RJ, Hernandez-Sarabia JA, Pagan JI, Girts RM, Harmon KK, Stute K, Coker NA, **Carr JC**, Ye X, Stock MS, DeFreitas JM. (2022). *Medicine & Science in Sports & Exercise Supplement*.
- "Physical Activity Behavior in Persons with Parkinson's Disease." Henige J, Williams K, Dierckman K, Thijs Z, King AC, Watts CR, **Carr JC**, Porter RR. International Journal of Exercise Science - American College of Sports Medicine – Texas Chapter Annual Conference 2022, Waco, TX.
- "Reliability and validity of balance and mobility outcomes in Parkinson's Disease: Using multiple baseline testing approach." Chen K, Thijs Z, Porter R, Watts C, **Carr JC**, King A. (2022) International Society of Posture and Gait Research Conference, Montreal, Canada.
- "Fatigue and Recovery Profiles of Unilateral Resistance Exercise in a Resistance Trained Population." Dudar MD, Voskuil CC, Burney CS, **Carr JC**. (2022). International Journal of Exercise Science: Conference Proceedings, Vol. 2, Iss. 14, Article 72.
- "Sex-Specific Reliability of Lower Limb Corticospinal Excitability and Silent Periods." Pagan JI, Harmon KK, Girts RM, MacLennan RJ, Hernandez Sarabia JA, Coker NA, **Carr JC**, Ye X, Defreitas JM, Stock MS. *Journal of Strength & Conditioning Supplement*. Poster Presentation at the National Strength and Conditioning Association National Conference, 2020, Las Vegas, NV.
- "Minimizing Interpulse Variability in Corticospinal Excitability: How Many TMS Pulses Are Optimal." Pagan JI, Girts RM, Harmon KK, Rodriguez G, MacLennan RJ, Hernandez Sarabia JA, Coker NA, **Carr JC**, Ye X, DeFreitas JM, Stock MS. *Journal of Strength & Conditioning Supplement*. Poster Presentation at the National Strength and Conditioning Association National Conference, 2020, Las Vegas, NV.
- "Test-retest reliability of corticospinal excitability and inhibition of an agonist-antagonist pair." Harmon KK, Girts RM, Pagan JI, Rodriguez G, MacLennan RJ, Hernandez Sarabia JA, Coker NA, **Carr JC**, Ye X, DeFreitas JM, Stock MS. *Journal of Strength & Conditioning Supplement*. Poster Presentation at the National Strength and Conditioning Association National Conference, 2020, Las Vegas, NV.

Abstracts and Collaborations

- "Unilateral training accelerates strength recovery following orthopedic immobilization." (2023). **Carr JC**. *Journal of Strength & Conditioning Supplement*. Podium Presentation at the National Strength and

Conditioning Association National Conference, 2023, Las Vegas, NV.

- "Functional Mobility and Postural Control in People with Parkinson's Disease: Using a Multiple Baseline Design." King AC, Thijs Z, Porter RR, **Carr JC**, Watts CR. (2022). North American Society for the Psychology of Sport and Physical Activity, Waikoloa Beach, HI.
- "The influence of sex on the cross-over effects of handgrip fatigue." (2021). **Carr JC**, Bemben MG, DeFreitas JM. *International Journal of Exercise Science: Conference Proceedings*, Vol. 2, Iss. 13, Article 80.
- "Illusionary mirror visual feedback during unilateral fatigue affects contralateral rapid force but not strength." **Carr JC**, Stock MS, Bemben MG, DeFreitas JM. *Journal of Strength & Conditioning Supplement*. Podium Presentation at the National Strength and Conditioning Association National Conference, 2019, Washington, D.C.
- "Is the magnitude of cross-education dependent on initial strength levels?" **Carr JC**, Ye X, Stock MS, Wages NP, DeFreitas JM. *Journal of Strength & Conditioning Supplement*. Podium Presentation at the National Strength and Conditioning Association National Conference, 2018, Indianapolis, IN.
- "Unilateral strength training changes direction of strength asymmetry but not magnitude in healthy individuals." **Carr JC**, Ye X, Wages NP, Bemben MG. *Medicine & Science in Sports & Exercise Supplement*. Poster Presentation at the American College of Sports Medicine Annual meeting, 2018, Minneapolis, MN.
- "Increased maximal force and electromyographic amplitude following three submaximal isometric training sessions." **Carr JC**, Beck TW, Ye X, Wages NP. *Journal of Strength & Conditioning Supplement*. Poster Presentation at the National Strength and Conditioning Association National Conference, 2017, Las Vegas, NV.
- "Inter-individual variability in the mechanomyographic frequency response during a sustained isometric force task." **Carr JC**, Beck TW, Ye X, Wages NP. *Medicine & Science in Sports & Exercise Supplement*. Poster Presentation at the American College of Sports Medicine Annual meeting, 2017, Denver, CO.
- "Mechanomyographic response for the biceps brachii during a sustained maximal voluntary contraction." **Carr JC**, Beck TW, Ye X, Wages NP. *Journal of Strength & Conditioning Supplement*. Poster Presentation at the National Strength and Conditioning Association National Conference, 2016, New Orleans, LA.

Presentations and Invited Talks

National

1. Title: "The Long-Held Promise of Cross-education: When, Why, and How?"
Event: Invited talk at The Institute of Exercise Physiology and Rehabilitation Sciences Annual Conference, Orlando, Florida, February 2024.

Summary: Since 1894, the phenomenon of muscle strength and force control 'transferring' to untrained muscles has intrigued the medical and physiological communities. Beyond the curious physiology, this adaptation has held promising clinical potential for over a century. But over 100 years later, has the promise been delivered? This talk will examine the evidence for when, why, and how cross-education training may be implemented. This presentation invites you to consider a century-old puzzle and discover its modern relevance.

Regional

1. **Title:** “Unilateral Exercise Confers Bilateral Neuromuscular Adaptations: Implications of Cross-education for Athlete Rehabilitation”
Event: Invited talk at National Strength and Conditioning Association’s Midwest Regional Conference, College Station, Texas, April 2024.

Professional Service & Activity

Service to the Profession

Editorial Board Membership

Associate Editor, Journal of Strength and Conditioning Research

Associate Editor, Applied Physiology, Nutrition, and Metabolism

External Ad Hoc Reviewer

- *JOURNAL OF MECHANICAL BEHAVIOR AND BIOMEDICAL MATERIALS*
- *JOURNAL OF MUSCULOSKELETAL AND NEURONAL INTERACTIONS*
- *SCANDINAVIAN JOURNAL OF MEDICINE & SCIENCE IN SPORTS*
- *JOURNAL OF STRENGTH AND CONDITIONING RESEARCH*
- *JOURNAL OF ELECTROMYOGRAPHY AND KINESIOLOGY*
- *APPLIED PHYSIOLOGY, NUTRITION, AND METABOLISM*
- *MEDICINE AND SCIENCE IN SPORT AND EXERCISE*
- *INTERNATIONAL JOURNAL OF SPORTS MEDICINE*
- *EUROPEAN JOURNAL OF APPLIED PHYSIOLOGY*
- *JOURNAL OF SPORTS MEDICINE AND THERAPY*
- *JOURNAL OF PHYSICAL THERAPY IN SPORT*
- *SPORTS MEDICINE AND HEALTH SCIENCE*
- *EXPERIMENTAL BRAIN RESEARCH*
- *JOURNAL OF SPORTS SCIENCES*
- *JOURNAL OF HUMAN KINETICS*
- *HUMAN MOVEMENT SCIENCE*
- *FRONTIERS IN PHYSIOLOGY*
- *SPORTS MEDICINE*
- *BIOLOGY OF SPORT*
- *KINESIOLOGY*
- *PLOS ONE*

Grant Reviewer

- National Strength and Conditioning Association Foundation
2021, 2022, 2023, 2024

- Medical Research Council, United Kingdom Research and Innovation 2021

Professional Memberships

- Texas American College of Sports Medicine
- American College of Sports Medicine
- National Strength and Conditioning Association
- International Society of Electrophysiology and Kinesiology

Professional Certifications

- Certified Strength & Conditioning Specialist - National Strength & Conditioning Association
- First Aid, CPR & AED - American Red Cross