

PAUL R. HIBBING, PH.D.

**Postdoctoral Research Scholar
Children's Mercy Kansas City
Center for Children's Healthy Lifestyles & Nutrition**

2240 Kenwood Ave, Room 2M02.45 | Kansas City, MO 64108
816.302.3183 | prhibbing@cmh.edu

EDUCATION

Doctor of Philosophy (May 2020)

University of Tennessee, Knoxville

Major: Kinesiology and Sport Studies
Specialization: Exercise Physiology
Cognate: Statistics
Dissertation: Calibration and validation of gyroscope inclusive youth Sojourn models
Committee: Scott E. Crouter (Major Professor)
David R. Bassett Jr.
Dawn P. Coe
Haileab Hilafu

Master of Science (August 2016)

Iowa State University

Major: Kinesiology
Thesis: Estimation of physical activity intensity using triaxial ActiGraph accelerometers in youth populations: Impact of data type, attachment site, and modeling approach, including adaptations of the Sojourn method for varied use in youth
Committee: Gregory J. Welk (Major Professor)
Laura D. Ellingson
Philip M. Dixon

Bachelor of Science (August 2014)

Iowa State University

Major: Kinesiology and Health
Minors: German Language
Music Technology

PROFESSIONAL EXPERIENCE

Postdoctoral Training

Positions/Appointments

- Research Scholar..... 07/2020 – present
*Children’s Mercy Kansas City
Center for Children’s Healthy Lifestyles & Nutrition (director Ann Davis)
Primary mentors: Jordan Carlson, Robin Shook*

Trainings/Courses

- Physical Activity & Public Health09/14/2021 – 09/21/2021
*Postgraduate Course on Research Directions and Strategies (director Russell Pate)
University of South Carolina
Arnold School of Public Health*

Fee-for-Service Research Consultancies

- British Youth Physical Activity Measurement Study 07/2017 – 09/2017
*Supervisors: Greg Welk (Iowa State University) and Stuart Fairclough (Edge Hill University)
Description: Managed activity monitor data from free-living youth*
- Youth Physical Activity Measurement Study 01/2019 – 06/2019
*Supervisor: Greg Welk (Iowa State University)
Description: Managed activity monitor data from free-living youth*
- Gestational Weight Gain and Optimal Wellness Study 06/2020
*Supervisor: Samantha Ehrlich (University of Tennessee, Knoxville)
Description: Performed logistic regression analyses*

Graduate Research Assistantships

- Iowa State University 08/2014 – 07/2016
*Department of Kinesiology
Physical Activity and Health Promotion Lab (director Greg Welk)
Funded by NIH R21CA188641 and NCI subcontract HHSN261201200028I (Westat)*
- University of Tennessee, Knoxville 08/2016 – 05/2020
*Department of Kinesiology, Recreation, and Sport Studies
Applied Physiology Lab (director Scott Crouter)
Funded by NIH R01HD083431*

Other Research Positions

- Undergraduate Research Assistant 09/2013 – 08/2014
*Iowa State University
Department of Kinesiology
Physical Activity and Health Promotion Lab (director Greg Welk)*

- Summer Research Intern..... 05/2014 – 08/2014
Iowa State University
Department of Kinesiology
Neurophysiology Lab (director Elizabeth Stegemöller)

Research Mentorship of Undergraduate Students

Iowa State University

Darby Flatley, 2015-2016; remotely through 2017 (then Welk lab assistant; now physician assistant at Trouvaille Memory Care Suites); **Ayla Heder, 2015-2016** (then Welk lab assistant; now project manager at Primary Health Care, Inc); **Bailie Kies, 2015-2016** (then Welk lab assistant; now registered dietician).

University of Tennessee, Knoxville

B. Jesse Clendenin, 2017-2019 (then Crouter lab assistant; now medical student at Lincoln Memorial University); **Brice Walkowski, 2018-2020** (then Crouter lab assistant; ongoing).

Children’s Mercy Kansas City

Christine Ibeagi, 2021 (then summer research scholar in Shook lab; now senior at Missouri Southern State University).

Teaching Positions

(● undergraduate courses | ○ graduate courses)

Undergraduate Teaching Assistant (Iowa State University)

- BIOL 255L (Laboratory Section: Human Anatomy)Fall 2013

Graduate Teaching Assistant (University of Tennessee, Knoxville)

- KNS 414 (Laboratory Section: Fitness Testing and Exercise Prescription).....May Term 2017
- KNS 532 (Laboratory Section: Exercise Physiology).....Fall 2017, Fall 2019
- SOWK 665 (Advanced Quantitative Research Methods)Fall 2018

Guest Lecturer (University of Tennessee, Knoxville)

- “Current Research in the Applied Physiology Laboratory” 04/20/2017
KNS 350 (Physical Activity Epidemiology)
- “Physical Activity and Wellness” 09/13/2017
FYS 129 (Wellness: The Art and Science)
- “Cardiovascular Physiology I” 10/18/2017
KNS 532 (Exercise Physiology)
- “Cardiovascular Physiology II” 10/23/2017
KNS 532 (Exercise Physiology)
- “Assessing Energy Expenditure in Youth” 02/06/2020
KNS 365 (Pediatric Exercise Science)
- “Measuring Physical Activity in Youth” 03/05/2020
KNS 365 (Pediatric Exercise Science)

GRANT FUNDING

Current Research Support

1. Kenneth and Eva Smith Award (Children’s Mercy Kansas City).....10/2021-09/2023
Role: Key Personnel (Primary Investigator: Shook)
Title: Fitbit Teens: A measurement error approach to estimating energy balance in free-living adolescents
Details: The goal of this study is to advance the assessment of energy balance in youth through measurement error modeling. I will assist in managing and processing data from wearable activity monitors.

Applications Awaiting Notice of Award

2. R01DK129428 (National Institutes of Health).....Resubmitted July 2021
Role: Consultant (Primary Investigators: Crouter and Ding)
Title: Use of accelerometer and gyroscope data to improve precision of estimates of physical activity type and energy expenditure in free-living adults
Details: The goal of this study was to pair multi-sensor physical activity monitoring with advanced machine learning to improve the precision of physical activity estimates. In response to PA-18-856: Diet and Physical Activity Assessment Methodology.
Score: 12th percentile (Payline: 16th)

Applications Under Review

3. STAR 2.0 mini grant (Internal; see details).....Submitted March 2022
Role: Co-lead mentor with Carlson
Details: The purpose of the Summer Training in Academic Research (STAR) program is to provide high school students from underrepresented backgrounds with a mentored research training experience during a six-week summer program, culminating in manuscript submission for peer review. The proposed project is focused on validating estimates of total sleep and sleep stages from a Garmin Vivofit 4 device against gold standard polysomnography collected during overnight sleep studies in the Children’s Mercy Sleep Clinic.

Applications Not Funded

4. R01DK129662 (National Institutes of Health)..... Resubmitted October 2020
Role: Co-Investigator (Primary Investigator: Carlson)
Title: Scaling up Ecological Video Identification of Physical Activity (EVIP) for community-based research
Details: The goal of this study is to advance computer vision approaches for providing automated ecological physical activity assessment in parks, schools, and sports facilities. In response to PA-18-856: Diet and Physical Activity Assessment Methodology.

5. Collaborative Pilot Award (Internal; see details)..... *Submitted November 2020*
- Role:** Co-Investigator (Primary Investigators: Shook and Creasy)
- Title:** Fitbit Teens: A novel estimation of energy balance through the calibration of consumer devices in free-living adolescents
- Details:** The goal of this pilot study was to advance the assessment of energy balance in youth through the use of measurement error modeling. In response to a collaborative pilot program of Children’s Mercy Kansas City and the Colorado Nutrition and Obesity Research Center.
6. R01DKxxxxxx (National Institutes of Health)..... *Submitted June 2021*
- Role:** Key personnel (Primary Investigator: Shook)
- Title:** A measurement error approach to estimating energy balance in free-living adults
- Details:** The goal of this study was to use measurement error modeling to improve utility of smart scales and smart watches for assessing energy intake via the intake balance method. In response to PA-18-857: Diet and Physical Activity Assessment Methodology.
7. R01CA255858 (National Institutes of Health)..... *Resubmitted July 2021*
- Role:** Consultant (Primary Investigator: Welk)
- Title:** Measurement error modeling to enhance calibration of the youth activity profile
- Details:** The goal of this study was to refine the utility of the Youth Activity Profile for national applications and surveillance. In response to PA-18-856: Diet and Physical Activity Assessment Methodology.
8. F32HL163951 (National Institutes of Health)..... *Submitted August 2021*
- Role:** Primary Investigator
- Title:** Occupational and non-occupational physical activity have differential associations with cardiovascular disease versus diabetes in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)
- Details:** The goal of this project was to provide me training and experience related to research in the area of physical activity epidemiology, specifically prevention of cardiovascular and cardiometabolic disease in an at-risk and underrepresented population. In response to PA-21-048: Ruth L. Kirschstein National Research Service Award (NRSA) Individual Postdoctoral Fellowship (Parent F32).
9. TL1 Award (Internal/National Institutes of Health)..... *Submitted January 2022*
- Role:** Primary Investigator/Trainee
- Title:** Occupational and non-occupational physical activity have differential associations with cardiovascular disease versus diabetes in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)
- Details:** The goal of this project was to provide me training and experience related to research in the area of population health, specifically prevention of cardiovascular and cardiometabolic disease in an at-risk and underrepresented population. In response to an internal RFA at the University of Kansas Medical Center, as part of the Frontiers Clinical and Translational Science Institute programming (UL1TR002366).

Peer-Reviewed Publications

1. **Hibbing P**, Kim Y, Saint-Maurice PF, & Welk GJ. (2016) Impact of activity outcome and measurement instrument on estimates of youth compliance with physical activity guidelines: A cross-sectional study. *BMC Public Health* [internet]. 16, 223. doi: 10.1186/s12889-016-2901-8.
2. Stegemöller EL, Radig H, **Hibbing P**, Wingate J, & Sapienza C. (2017) Effects of singing on voice, respiratory control, and quality of life in persons with Parkinson's Disease. *Disability and Rehabilitation*. 39(6), 594-600. doi: 10.3109/09638288.2016.1152610.
3. Stegemöller EL, **Hibbing P**, Radig H, & Wingate J. (2017) Therapeutic singing as an early intervention strategy for swallowing in persons with Parkinson's Disease. *Complementary Therapies in Medicine*. 31, 127-133. doi: 10.1016/j.ctim.2017.03.002.
4. Ellingson L, **Hibbing P**, Kim Y, Frey-Law L, Saint-Maurice P, & Welk G. (2017) Lab-based validation of different data processing methods for wrist-worn ActiGraph accelerometers in adults. *Physiological Measurement*. 38(6), 1045-1060. doi: 10.1088/1361-6579/aa6d00.
*Selected as a Highlight of 2017 by *Physiological Measurement*. See http://iopscience.iop.org/journal/0967-3334/page/Highlights_of_2017.
5. Kim Y, **Hibbing P**, Saint-Maurice PF, Ellingson LD, Hennessy E, Wolff-Hughes DL, Perna FM, & Welk GJ. (2017) Surveillance of youth physical activity and sedentary behavior with wrist accelerometry. *American Journal of Preventative Medicine*. 52(6), 872-879. doi: 10.1016/j.amepre.2017.01.012.
6. Saint-Maurice PF, Kim Y, **Hibbing P**, Oh A, Perna FM, & Welk GJ. (2017) Calibration and validation of the Youth Activity Profile: The FLASHE study. *American Journal of Preventative Medicine*. 52(6), 880-887. doi: 10.1016/j.amepre.2016.12.010.
7. Bai Y, **Hibbing P**, Mantis K, & Welk GJ. (2018) Comparative evaluation of heart rate-based monitors: Apple Watch vs Fitbit Charge HR. *Journal of Sports Sciences*. 36(15), 1734-1741. doi: 10.1080/02640414.2017.1412235.
8. Dixon PM, Saint-Maurice PF, Kim Y, **Hibbing P**, Bai Y, & Welk GJ. (2018) A primer on the use of equivalence testing for evaluating measurement agreement. *Medicine and Science in Sports and Exercise*. 50(4), 837-845. doi: 10.1249/MSS.0000000000001481.
9. **Hibbing PR**, Ellingson LD, Dixon PM, & Welk GJ. (2018) Adapted Sojourn models to estimate activity intensity in youth: A suite of tools. *Medicine and Science in Sports and Exercise*. 50(4), 846-854. doi: 10.1249/MSS.0000000000001486.
10. **Hibbing PR**, LaMunion SR, Kaplan AS, & Crouter SE. (2018) Estimating energy expenditure with ActiGraph GT9X inertial measurement unit. *Medicine and Science in Sports and Exercise*. 50(5), 1093-1102. doi: 10.1249/MSS.0000000000001532.
11. Stegemöller EL, Tatz JR, Warnecke A, **Hibbing P**, Bates B, & Zaman A. (2018) Influence of music style and rate on repetitive finger tapping. *Motor Control*. 22(4), 472-485. doi: 10.1123/mc.2017-0081.

12. Toth LP, Park S, Pittman WL, Sarisaltik D, **Hibbing PR**, Morton A, Springer CM, Crouter SE, & Bassett DR. (2018) Validity of activity tracker step counts during walking, running, and activities of daily living. *Translational Journal of the American College of Sports Medicine*. 3(7), 52-59. doi: 10.1249/TJX.000000000000057.
13. Stegemöller EL, Izbicki P, & **Hibbing P** (2018). The influence of moving with music on motor cortical activity. *Neuroscience Letters*. 683, 27-32. doi: 10.1016/j.neulet.2018.06.030.
14. Gharghabi S, Yeh CM, Ding Y, Ding W, **Hibbing P**, LaMunion S, Kaplan A, Crouter SE, & Keogh E. (2018) Domain agnostic online semantic segmentation for multi-dimensional time series. *Data Mining and Knowledge Discovery*. 33(1), 96-130. doi: 10.1007/s10618-018-0589-3.
15. Crouter SE, **Hibbing PR**, & LaMunion SR. (2018) Use of objective measures to estimate sedentary time in youth. *Journal for the Measurement of Physical Behaviour*. 1(3), 136-142. doi: 10.1123/jmpb.2018-0007.
16. Toth LP, Park S, Pittman WL, Sarisaltik D, **Hibbing PR**, Morton AL, Springer CM, Crouter SE, & Bassett DR. (2019) Effects of brief intermittent walking bouts on step count accuracy of wearable devices. *Journal for the Measurement of Physical Behaviour*. 2(1), 13-21. doi: 10.1123/jmpb.2018-0050.
17. Noonan RJ, Christian D, Boddy LM, Saint-Maurice PF, Welk GJ, **Hibbing PR**, & Fairclough SJ. (2019) Accelerometer and self-reported measures of sedentary behaviour and associations with adiposity in UK youth. *Journal of Sports Sciences*. 37(16), 1919-1925. doi: 10.1080/02640414.2019.1605649.
18. Park S, Toth LP, **Hibbing PR**, Springer CM, Kaplan AS, Feyerabend MD, Crouter SE, & Bassett DR. (2019) Dominant vs non-dominant wrist placement of activity monitors: Impact on steps per day. *Journal for the Measurement of Physical Behaviour*. 2(2), 118-123. doi: 10.1123/jmpb.2018-0060.
19. Fairclough SJ, Christian DL, Saint-Maurice PF, **Hibbing PR**, Noonan RJ, Welk GJ, Dixon P, & Boddy LM. (2019) Calibration and validation of the Youth Activity Profile as a physical activity and sedentary behaviour surveillance tool for English youth. *International Journal of Environmental Research and Public Health* [internet]. 16(19). doi: 10.3390/ijerph16193711.
20. Ellingson L, **Hibbing PR**, Welk GJ, Dailey D, Rakel B, Crofford LJ, Sluka KA, & Frey-Law LA. (2019) Choice of processing method for wrist-worn accelerometers influences interpretation of free-living physical activity data in a clinical sample. *Journal for the Measurement of Physical Behaviour*. 2(4), 228-236. doi: 10.1123/jmpb.2018-0062.
21. Crouter SE, LaMunion SR, **Hibbing PR**, Kaplan AS, & Bassett DR. (2019) Accuracy of the Cosmed K5 portable calorimeter. *PLoS ONE* [internet]. 14(12). doi: 10.1371/journal.pone.0226290.
22. LaMunion SR, Blythe AL, **Hibbing PR**, Kaplan AS, Clendenin BJ, & Crouter SE. (2020) Use of consumer monitors for estimating energy expenditure in youth. *Applied Physiology, Nutrition, and Metabolism*. 45(2), 161-168. doi: 10.1139/apnm-2019-0129.
23. Ehrlich SF, Casteel AJ, Crouter SE, **Hibbing PR**, Hedderson MM, Brown SD, Galarce M, Coe D, Bassett D, & Ferrara A. (2020) Alternative wear-time estimation methods compared to traditional diary logs for wrist-worn ActiGraph accelerometers in pregnant women. *Journal for the Measurement of Physical Behaviour*. 3(2), 110-117. doi: 10.1123/jmpb.2019-0049.
24. **Hibbing PR**, Bassett DR, Coe DP, LaMunion SR, & Crouter SE. (2020) Youth metabolic equivalents differ depending on operational definitions. *Medicine and Science in Sports and Exercise*. 52(8), 1846-1853. doi: 10.1249/MSS.0000000000002299.

25. **Hibbing PR**, Bassett DR, & Crouter SE. (2020) Modifying accelerometer cut-points affects criterion validity in simulated free-living for adolescents and adults. *Research Quarterly for Exercise and Sport*. 91(3), 514-524. doi: 10.1080/02701367.2019.1688227.
26. **Hibbing PR**, LaMunion SR, Hilafu H, & Crouter SE. (2020) Evaluating the performance of sensor-based bout detection algorithms: The transition pairing method. *Journal for the Measurement of Physical Behaviour*. 3(3), 219-227. doi: 10.1123/jmpb.2019-0039.
27. Bruce JM, Cozart JS, Shook RP, Ruppen SP, Siengasukon C, Simon S, Befort C, Lynch S, Mahmoud R, Drees B, Norouzinia AN, Bradish T, Posson P, **Hibbing PR**, & Bruce AS. (2021) Modifying diet and exercise in MS (MoDEMS): Study design and protocol for a telehealth weight loss intervention for adults with obesity & multiple sclerosis. *Contemporary Clinical Trials* [internet]. 107, 106495. doi: 10.1016/j.cct.2021.106495.
28. Stegemöller EL, Ferguson T, Zaman A, **Hibbing P**, Izbicki P, & Krigolson O. (2021) Finger tapping to different styles of music and changes in cortical oscillations. *Brain and Behavior* [internet]. 11(9), e2324. doi: 10.1002/brb3.2324.
29. **Hibbing PR**, Lamoureux NR, Matthews CE, & Welk GJ. (2021) Protocol and data description: The free-living activity study for health. *Journal for the Measurement of Physical Behaviour*. 4(3), 197-204. doi: 10.1123/jmpb.2020-0052.
30. Welk GJ, Saint-Maurice PF, Dixon PM, **Hibbing PR**, Bai Y, & McLoughlin GM. (2021) Calibration of the online youth activity profile assessment for school-based applications. *Journal for the Measurement of Physical Behaviour*. 4(3), 236-246. doi: 10.1123/jmpb.2020-0048.
31. Forseth B, Ortega A, **Hibbing PR**, Moon M, Steel C, Singh M, Kollu A, Miller B, Miller M, Staggs V, Calvert H, Davis AM, & Carlson JA. (2021) Adding family digital supports to classroom-based physical activity interventions to target in- and out-of-school activity: An evaluation of the Stay Active intervention during the COVID-19 pandemic. *Journal of Healthy Eating and Active Living*. 1(4), 214-228. doi: 10.51250/jheal.v1i4.31.
32. Steel C, Crist K, Grimes A, Bejarano C, Ortega A, **Hibbing PR**, Schipperijn J, & Carlson JA. (2021) Validity of a GPS-based algorithm and consumer wearables for classifying active trips in children and adults. *Journal for the Measurement of Physical Behaviour*. 4(4), 321-332. doi: 10.1123/jmpb.2021-0019.
33. Greenwood-Hickman MA, Rosenberg D, Bellettiere J, Carlson J, **Hibbing PR**, Jankowska MM, Kumar A, LaCroix AZ, Nakandala S, Tuz-Zahra F, Zou J, & Natarajan L. (2021) The CNN Hip Accelerometer Posture (CHAP) method for classifying sitting patterns from hip accelerometers: A validation study. *Medicine and Science in Sports and Exercise*. 53(11), 2445-2454. doi: 10.1249/mss.0000000000002705.
34. Creasy SA, **Hibbing PR**, Cotton E, Lyden K, Ostendorf DM, Willis EA, Pan Z, Melanson EL, & Catenacci VA. (2021) Temporal patterns of physical activity in successful weight loss maintainers. *International Journal of Obesity*. 45(9), 2074-2082. doi: 10.1038/s41366-021-00877-4.
35. **Hibbing PR**, Bellettiere J, & Carlson JA. (2022) Sedentary profiles: A new perspective on accumulation patterns in sedentary behavior. *Medicine and Science in Sports and Exercise*. 54(4), 696-706. doi: 10.1249/MSS.0000000000002830.
36. Lamoureux NR, **Hibbing PR**, Matthews CE, & Welk GJ. (2022) Integration of report-based methods to enhance the interpretation of monitor-based research: Results from the FLASH Project. *Journal for the Measurement of Physical Behaviour*. 5(1), 42-48. doi: 10.1123/jmpb.2021-0029.

Manuscripts in Review

1. Bai Y, Saint-Maurice PF, McLoughlin GM, **Hibbing PR**, & Welk GJ. (in Review) The measurement reliability and equivalence of print versus online versions of the Youth Activity Profile. *Measurement in Physical Education and Exercise Science*.
2. **Hibbing PR**, Creasy SA, & Carlson JA. (in Review) Clustered Recognition of Intermittent Bouts (CRIB): A novel method for device-based physical behavior analysis. *Journal for the Measurement of Physical Behaviour*.
3. Carlson JA, Ridgers ND, Nakandala S, Zablocki R, Tuz-Zahra F, Bellettiere J, **Hibbing PR**, Steel C, Jankowska MM, Rosenberg D, Zou J, LaCroix AZ, Kumar A, & Natarajan L. (in Review) CHAP-youth: A valid method for estimating pediatric sit-to-stand transitions and sitting bout patterns from hip accelerometers. *International Journal of Behavioral Nutrition and Physical Activity*.
4. Bellettiere J, Carlson JA, Di C, Dillon L, Dunstan D, Greenwood-Hickman MA, Healy GN, **Hibbing PR**, Jankowska MM, Kumar A, LaCroix AZ, Nakandala S, Owen N, Ridgers ND, Rosenberg D, Tuz-Zahra F, Winkler E, Zou J, & Natarajan L. (in Review) CHAP-Adult: A reliable and valid algorithm to classify sitting and measure sitting patterns using data from hip-worn accelerometers in adults aged 35+. *Journal for the Measurement of Physical Behaviour*.
5. **Hibbing PR**, Shook RP, Panda S, Manoogian ENC, Mashek DG, & Chow LS. (in Review) Predicting energy intake with an accelerometer-based intake-balance method: Implications for time-restricted eating interventions. *British Journal of Nutrition*.
6. Ortega A, Forseth B, Steel C, **Hibbing PR**, & Carlson JA. (in Review) Convergent validity between activPAL and ActiGraph for measuring moderate-to-vigorous physical activity in youth and adults. *Journal for the Measurement of Physical Behaviour*.

Non-Peer-Reviewed Publications

1. Welk GJ, Saint-Maurice PF, Kim Y, Ellingson E, **Hibbing P**, Wolff-Hughes D, & Perna FM. (2017) Understanding and interpreting error in physical activity data: Insights from the FLASHE study. *American Journal of Preventative Medicine*. 52(6), 836-838.
2. **Hibbing P**, LaMunion S, & Toth L. (2017) Fitness trackers can be fashionable and functional. *ACSM Fit Society Page*. 19(3):3-4.

Manuscripts in Preparation

1. Posson PM, **Hibbing PR**, Carbuhn A, White D, Shakhnovich V, & Sullivan D, Shook RP. Resting energy requirements in overweight and obese adolescents: Do prediction equations accurately estimate needs? Target journal: *American Journal of Clinical Nutrition*.
2. Carlson JA, **Hibbing PR**, Forseth B, Duran A, Diaz K, Bejarano CM, Castaneda SF, Garcia ML, Sotres-Alvarez D, Perreira KM, Daviglius M, Van Horn L, Gellman MD, Isasi CR, Cai J, Delamater AM, Thyfault J, Staggs V, & Gallo LC. Sedentary bout patterns and metabolic health in the Hispanic Community Health Study/SOL (HCHS/SOL) Youth. Target journal: TBD.
3. **Hibbing PR**, LaMunion SR, Bassett DR, Coe DP, Hilafu H, Walkowski B, & Crouter SE. Do sensor fusion and change point detection improve device-based predictions of physical activity intensity in youth? Target journal: *Medicine and Science in Sports and Exercise*.

4. **Hibbing PR**, Carlson JA, Simon SL, Melanson EL, & Creasy SA. Convergent validity of time in bed estimates from activPAL and Actiwatch in free-living youth and adults. Target journal: TBD.

Book Chapters in Preparation

1. Crouter SE, **Hibbing PR**, & LaMunion SR. Physical activity assessment. In: *Health Professionals Guide to Weight Management for Adults*. Academy of Nutrition and Dietetics.

National/International Abstracts and/or Presentations

1. Stegemöller EL, **Hibbing P**, Brinkman A, Tatz J, Kinedinst B, & Frick P. (2015) The influence of activating versus relaxing music on repetitive finger movement and associated motor cortical activity. Poster presented at the Society for Neuroscience 45th annual meeting, Chicago, IL.
2. Stegemöller EL, **Hibbing P**, & Radig H. (2015) Effects of singing on speech and swallow in patients with Parkinson's disease. Poster presented at the Movement Disorders Society 19th annual meeting, San Diego, CA.
3. **Hibbing PR**, Kim Y, Saint-Maurice PF, & Welk GJ. (2015) Activity monitor agreement in assessing compliance with Step and physical activity guidelines in youth. *Medicine and Science in Sports and Exercise*. 47(5 Suppl 1), 921. Poster presented at the American College of Sports Medicine 62nd annual meeting, San Diego, CA.
4. Saint-Maurice PF, **Hibbing P**, Bai Y, & Welk GJ. (2016) Agreement between print and online versions of the Youth Activity Profile. *Medicine and Science in Sports and Exercise*. 48(5 Suppl 1), 313. Slides presented at the American College of Sports Medicine 63rd annual meeting, Boston, MA.
5. Kim Y, **Hibbing P**, Ellingson LD, Saint-Maurice PF, Hennessy E, McClain J, & Welk GJ. (2016) Comparison of outcomes between raw acceleration and counts-based methods for processing wrist-worn accelerometers: the FLASHE study. *Medicine and Science in Sports and Exercise*. 48(5 Suppl 1), 812. Slides presented at the American College of Sports Medicine 63rd annual meeting, Boston, MA.
6. **Hibbing P**, Ellingson L, Dixon P, & Welk G. (2017) Estimating physical activity intensity in youth with accelerometers: A flexible suite of tools. *Medicine and Science in Sports and Exercise*. 49(5 Suppl 1), 475. Poster presented at the American College of Sports Medicine 64th annual meeting, Denver, CO.
7. Bai Y, Welk G, **Hibbing P**, & Mantis K. (2017) Which heart rate-based monitor is better: Apple Watch or Fitbit Charge HR? Slides presented at the 5th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Bethesda, MD.
8. Toth L, **Hibbing P**, Park S, Morton A, Pittman W, Sarisaltik D, Kaplan A, Crouter S, & Bassett D. (2017) Criterion validity of consumer and research grade activity monitors during brief, intermittent walking. Slides presented at the 5th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Bethesda, MD.
9. **Hibbing P**, LaMunion S, Bassett D, & Crouter S. (2017) Impact of inertial measurement unit on activity recognition using ActiGraph GT9X. Poster presented at the 5th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Bethesda, MD.

10. Kaplan A, Toth L, **Hibbing P**, Morton A, Park S, Pittman W, Sarisaltik D, Bassett D, & Crouter S. (2017) Sources of error for wearable step counters. Poster presented at the 5th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Bethesda, MD.
11. LaMunion S, **Hibbing P**, Bassett D, & Crouter S. (2017) Application of the ActiGraph GT9X IMU to estimate energy expenditure. Slides presented at the 5th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Bethesda, MD.
12. Crouter S, **Hibbing P**, LaMunion SR, & Bassett DR. (2017) Use of the ActiGraph GT9X IMU to predict energy expenditure. Slides presented at the 5th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Bethesda, MD.
13. Crouter SE, LaMunion SR, **Hibbing PR**, & Bassett DR. (2017) Use of a 2-Regression Model to Estimate Energy Expenditure using the ActiGraph GT9X IMU. Poster presented at the 4th International Conference on Recent Advances and Controversies in Measuring Energy Metabolism, Fribourg, Switzerland.
14. LaMunion SR, **Hibbing PR**, Bassett DR, & Crouter SE. (2017) Use of the ActiGraph GT9X Inertial Measurement Unit to Predict Energy Expenditure Using Artificial Neural Networks. Slides presented at the 4th International Conference on Recent Advances and Controversies in Measuring Energy Metabolism, Fribourg, Switzerland.
15. Kaplan AS, LaMunion SR, **Hibbing PR**, & Crouter SE. (2018) Use of consumer monitors for estimating energy expenditure in youth. *Medicine and Science in Sports and Exercise*. 50(5 Suppl 1), 262. Slides presented at the American College of Sports Medicine 65th annual meeting, Minneapolis, MN.
16. LaMunion SR, **Hibbing PR**, Kaplan AS, & Crouter SE. (2018) Physical activity category classification using the ActiGraph GT9X in youth. *Medicine and Science in Sports and Exercise*. 50(5 Suppl 1), 295. Poster presented at the American College of Sports Medicine 65th annual meeting, Minneapolis, MN.
17. **Hibbing PR**, Bassett DR, & Crouter SE. (2018) Modifying accelerometer cut-points affects criterion validity in free-living youth and adults. *Medicine and Science in Sports and Exercise*. 50(5 Suppl 1), 298. Poster presented at the American College of Sports Medicine 65th annual meeting, Minneapolis, MN.
18. Christian D, Saint-Maurice PF, **Hibbing P**, Noonan RJ, Boddy LM, Welk GJ, & Fairclough SJ. (2018) Calibration of the UK Youth Activity Profile. *Journal of Physical Activity and Health*. 15(10), S39. Slides presented at the 7th International Society for Physical Activity and Health Congress, London, England.
19. Crouter SE, LaMunion SR, **Hibbing PR**, Kaplan AS, Quarantillo ME, & Bassett DR. (2019) Accuracy of the Cosmed K5 portable metabolic system. *Medicine and Science in Sports and Exercise*. 51(6 suppl 1), 147. Slides presented at the American College of Sports Medicine 66th annual meeting, Orlando, FL.
20. Lamoureux NR, **Hibbing PR**, Matthews CE, & Welk GJ. (2019) Temporal relationships between the Act24 and a monitor-based method for estimating energy expenditure over a 24 hour period. *Medicine and Science in Sports and Exercise*. 51(6 suppl 1), 373. Poster presented at the American College of Sports Medicine 66th annual meeting, Orlando, FL.

21. **Hibbing PR** & Crouter SE. (2019) Resting energy expenditure and metabolic equivalents in youth: Impact of inconsistent operational definitions. *Medicine and Science in Sports and Exercise*. 51(6 suppl 1), 818-819. Poster presented at the American College of Sports Medicine 66th annual meeting, Orlando, FL.
22. **Hibbing PR**, LaMunion SR, Hilafu H, & Crouter SE. (2019) Evaluating the performance of bout detection algorithms for wearable sensors: The transition pairing method. Slides presented at the 6th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Maastricht, The Netherlands.
23. Crouter SE, Clendenin BJ, **Hibbing PR**, & LaMunion SR. (2019) Validity of consumer monitors for estimating steps in youth. Slides presented at the 6th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Maastricht, The Netherlands.
24. Ehrlich SF, Hedderson MM, Brown SD, Crouter SE, **Hibbing PR**, Feng J, Tsai AL, & Ferrara A. (2020) Objectively measured physical activity during the first trimester and glucose tolerance at 24-28 weeks gestation. *Medicine and Science in Sports and Exercise*. 52(7S), 100. Poster accepted for the American College of Sports Medicine 67th annual meeting (cancelled due to COVID-19 pandemic).
25. Hukka MK, LaMunion SR, **Hibbing PR**, & Crouter SE. (2020) Generational differences of consumer wearable devices for estimating physical activity outcomes. *Medicine and Science in Sports and Exercise*. 52(7S), 519. Rapid fire poster accepted for the American College of Sports Medicine 67th annual meeting (cancelled due to COVID-19 pandemic).
26. **Hibbing PR** & Crouter SE. (2020) Dynamic segmentation of youth accelerometer data by Sojourn and change point detection methods. *Medicine and Science in Sports and Exercise*. 52(7S), 824-825. Thematic poster accepted for the American College of Sports Medicine 67th annual meeting (cancelled due to COVID-19 pandemic).
27. Ehrlich SF, Hedderson MM, Brown SD, Crouter SE, **Hibbing P**, Feng J, Tsai AL, & Ferrara A. (2020) Objectively measured and self-reported physical activity in the first trimester of pregnancy, glucose tolerance, and gestational diabetes in women with overweight/obesity. *Diabetes*. 69(suppl 1) 1343-P. doi: 10.2337/db20-1343-P. Poster presented at the American Diabetes Association 2020 80th Scientific Sessions (held virtually due to COVID-19 pandemic).
28. Forseth B, Moon M, Singh M, Steel C, Ortega A, **Hibbing P**, Miller B, Miller M, Calvert H, Davis AM, & Carlson JA. (2021). Acceptability and impact of a remote classroom- and family-based physical activity interventions during the COVID-19 pandemic. Slides presented at the Active Living Conference (held virtually due to COVID-19 pandemic) of the Physical Activity Policy Research and Evaluation Network.
29. **Hibbing PR**, Carlson JA, Simon SL, Melanson EL, & Creasy SA. (2021) Convergent validity of Actiwatch and activPAL for assessing time in bed. *Journal for the Measurement of Physical Behaviour*. 4(S1), S20-S21. Virtual poster presented at the 8th International Conference on Ambulatory Monitoring of Physical Activity and Movement (held virtually due to COVID-19 pandemic).

Symposia

1. **Hibbing PR.** (2019) Accessing and using data through the FLASH GitHub repository. Presented in the symposium *Advancing collaborative activity monitor research using open-source tools* with co-presenters Greg Welk (chair) and Charles Matthews. 6th International Conference on Ambulatory Monitoring of Physical Activity and Movement, Maastricht, The Netherlands.

Regional/Institutional Presentations

1. **Hibbing P** & Devick R. (2014) The validity of an online tool for the assessment of physical activity behaviors in youth. Slides presented at the 8th Symposium on Undergraduate Research and Creative Expression, Ames, IA.
2. **Hibbing PR**, Bassett DR, & Crouter SE. (2018) Modifying accelerometer cut-points affects criterion validity in free-living youth and adults. Poster presented at the 46th annual meeting of the Southeast Chapter of the American College of Sports Medicine, Chattanooga, TN.
3. LaMunion SR, **Hibbing PR**, Kaplan AS, Bassett DR, & Crouter SE. (2018) Predicting energy expenditure with the ActiGraph GT9X IMU using artificial neural networks. Poster presented at the 46th annual meeting of the Southeast Chapter of the American College of Sports Medicine, Chattanooga, TN.
4. Kaplan AS, LaMunion SR, **Hibbing PR**, Bassett DR, & Crouter SE. (2018) Activity classification with the ActiGraph GT9X IMU using artificial neural networks. Poster presented at the 46th annual meeting of the Southeast Chapter of the American College of Sports Medicine, Chattanooga, TN.
5. Park S, Toth LP, **Hibbing PR**, Springer CM, Kaplan AS, Feyerabend MD, Crouter SE, & Bassett DR. (2018) Dominant vs non-dominant wear: A comparison of steps per day. Poster presented at the 46th annual meeting of the Southeast Chapter of the American College of Sports Medicine, Chattanooga, TN.
6. Kaplan AS, LaMunion SR, **Hibbing PR**, Bassett DR, & Crouter SE. (2018) Use of two-regression models to predict energy expenditure using wrist-worn GENEActivs in youth. Slides presented at the 46th annual meeting of the Midwest Chapter of the American College of Sports Medicine, Grand Rapids, MI.
7. **Hibbing PR** & Crouter SE. (2019) Resting energy expenditure and metabolic equivalents in youth: Impact of inconsistent operational definitions. Poster presented at the 47th annual meeting of the Southeast Chapter of the American College of Sports Medicine, Greenville, SC.
8. Clendenin BJ, **Hibbing PR**, LaMunion SR, & Crouter SE. (2019) Criterion validity of ActiGraph GT9X step predictions in youth. Slides presented at the 47th annual meeting of the Southeast Chapter of the American College of Sports Medicine, Greenville, SC.
9. Hukka MK, LaMunion SR, **Hibbing PR**, & Crouter SE. (2020) Generational differences of consumer wearable devices for estimating physical activity outcomes. Thematic poster presented at the 48th annual meeting of the Southeast Chapter of the American College of Sports Medicine, Jacksonville, FL.
10. Rand BG, Ferrara A, **Hibbing PR**, Hedderson MM, Brown SD, Badon SE, Crouter SE, & Ehrlich SF. (2021) The association of physical activity with lipid levels in pregnant women with overweight and obesity. Poster presented at the 49th annual meeting of the Southeast Chapter of the American College of Sports Medicine, held online due to COVID-19 pandemic.

11. Posson P, **Hibbing PR**, & Shook R. (2021) Resting energy expenditure equations have lower validity for overweight and obese versus healthy weight adolescents. Poster presented at the 6th annual Research at Children’s Mercy Month Poster Session, Kansas City, MO.

SOFTWARE PACKAGES

Comprehensive R Archive Network (CRAN)

1. **Paul R. Hibbing** (2018). TwoRegression: Process Data from Wearable Research Devices Using Two-Regression Algorithms. R package version 0.1.2. URL: <https://cran.r-project.org/package=TwoRegression>.
2. **Paul R. Hibbing** (2018). AGread: Read Data Files from ActiGraph Monitors. R package version 1.1.1. URL: <https://cran.r-project.org/package=AGread>.
3. **Paul R. Hibbing** (2018). Observation: Collect and Process Physical Activity Direct Observation Data. R package version 0.2.0. URL: <https://cran.r-project.org/package=Observation>.
4. **Paul R. Hibbing** (2019). PAutilities: Streamline physical activity research. R package version 1.0.1. URL: <https://cran.r-project.org/package=PAutilities>.
5. **Paul R. Hibbing** & Kate Lyden (2019). Sojourn.Data: Supporting Objects for Sojourn Accelerometer Methods. R package version 0.3.0. URL: <https://cran.r-project.org/package=Sojourn.Data>.
6. **Paul R. Hibbing**, Kate Lyden, & Isaac J. Schwabacher (2019). Sojourn: Apply Sojourn methods for processing ActiGraph accelerometer data. R package version 1.1.0. URL: <https://cran.r-project.org/package=Sojourn>.

GitHub

1. PAHP Lab (2020). FLASH: Free Living Activity Study for Health. R package version 0.1.1.9000. URL: <https://github.com/PAHPLabResearch/FLASH>. Access available by filling out the form at https://iaastate.qualtrics.com/jfe/form/SV_be0mbBZOOhMpeiX3.
2. **Paul R. Hibbing** (2022). PBpatterns: Analyze patterns of physical behavior. R package version 0.3.1.9000. URL: <https://github.com/paulhibbing/PBpatterns>.
3. **Paul R. Hibbing** (2022). daytime: Operate on time variables for physical behavior research. R package version 0.3.0.9000. URL: <https://github.com/paulhibbing/daytime>.

PROFESSIONAL SOCIETIES

American College of Sports Medicine.....	02/2016 – present
International Society for the Measurement of Physical Behaviour.....	03/2017 – present
International Society of Behavioral Nutrition and Physical Activity	06/2021 – present
American College of Sports Medicine, Southeast Regional Chapter	01/2018 – 12/2020

HONORS & AWARDS

Iowa State University

Dean's list.....	(College of Human Sciences, Fall '10 – Spring '14*)
Dean's Scholarship.....	(College of Human Sciences, '10-'11 academic year; \$1000)
Academic Recognition Award	('10-'11 academic year; \$1250)
Academic Recognition Award (Renewal).....	(Fall '11; \$625*)
Barbara E. Forker Leadership Award	(Department of Kinesiology, 2014)
Top 20 Graduating Senior Scholar	(Department of Kinesiology, 2014)
Graduate Magna Cum Laude.....	(2014)
Outstanding Master's Student Award	(Department of Kinesiology, 2016)
AKA [†] Master's Scholar Award (institutional winner)	(Department of Kinesiology, 2016)

University of Tennessee, Knoxville

Chancellor's Fellowship.....	('16-'17 academic year; \$10,000)
Chancellor's Fellowship (Renewal)	('17-'18 academic year; \$10,000)
Chancellor's Fellowship (Renewal)	('18-'19 academic year; \$10,000)
ShIPLEY-SWANN Graduate Fellowship	('18-'19 academic year; \$5000)
Andy Kozar Graduate Research Scholarship Award	(KRSS [†] , 2019; \$1000)
Chancellor's Fellowship (Renewal)	('19-'20 academic year; \$10,000)
ShIPLEY-SWANN Graduate Fellowship	('19-'20 academic year; \$5000)
Extraordinary Professional Promise Citation	(CEHHS [†] , 2020)
Edward K. Capen Award.....	(KRSS [†] , 2020; \$200)
Andy Kozar Graduate Research Scholarship Award	(KRSS [†] , 2020; \$1000)
AKA [†] Doctoral Scholar Award (institutional winner)	(KRSS [†] , 2020)
Helen B. Watson Faculty/Student Award for Outstanding Doct. Dissertation ...	(CEHHS [†] , 2020; \$375)

*No classes taken Spring '12

[†]AKA- American Kinesiology Association; KRSS- department of Kinesiology, Recreation, and Sport Studies;
CEHHS- College of Education, Health, and Human Sciences

SERVICE & OUTREACH

Professional Service

Manuscript Reviewer

- *Medicine and Science in Sports and Exercise* (11)
- *Journal for the Measurement of Physical Behaviour* (5)

- *Measurement in Physical Education and Exercise Science* (2)
- *Journal of Science and Medicine in Sport* (2)
- *European Journal of Sport Science* (1)
- *Journal of Sports Sciences* (1)
- *Applied Physiology, Nutrition, and Metabolism* (1)

Community Service

- Bike Rodeo Assistant 10/25/2016
Kids Can Bike! program
Knoxville, TN Parks and Recreation
- Laboratory Instructor..... 07/10/2018
Kids U Jr. Leadership Institute summer camp (ages 11-16)
University of Tennessee, Knoxville
- Laboratory Instructor..... 02/19/2019
Kingsport City Schools exercise physiology class on-campus visit
University of Tennessee, Knoxville



center for children's healthy lifestyles & nutrition

610 E. 22nd St. | Kansas City, MO 64108 | 816-234-9251 | www.chlnkc.org

26 March, 2022

Dear Members of the Search Committee,

Enclosed is my application for Job ID #161379, "Open-rank, Tenure-Track Faculty Positions - Kinesiology and Nutrition". I am currently a postdoctoral fellow at Children's Mercy Kansas City, where I work in the Center for Children's Healthy Lifestyles & Nutrition, a collaborative center supporting research in both youth and adults. I feel my background, skills, and interests are strongly aligned with this posting, and thus I am excited to apply.

I am an experienced interdisciplinary researcher with formal training in exercise physiology (Ph.D., 2020) and a strong background in data science for applied research. My primary research focus is on refining how energy balance-related behaviors are measured, especially using novel technologies and models (e.g., accelerometers and deep learning architectures). I am also focused on deploying those refined tools in research related to cardiovascular and cardiometabolic health. As part of my work, I have authored more than half a dozen R software packages that promote quality control and increased throughput for myself as well as others in the field. This is a unique part of my skillset that has greatly benefited my prior interdisciplinary work, and I believe it will become increasingly impactful as big data grows into a mainstay of research in our field.

My longstanding career goal has been to become an independent, NIH-funded investigator, and I am well positioned to do so, as shown in my **publication record** (5-9 peer-reviewed manuscripts per year since 2017; Google Scholar h-index of 12), **collaborative network** (more than 100 co-authors in 14 states plus the UK, Canada, and Denmark), **history of grant applications** (involved in 9 since October 2020; two as PI, another awaiting notice of award), and **training background** (9 years mentored by NIH-funded investigators, including 6 years of NIH-funded graduate research assistantships). I believe my research agenda will thrive in the Department of Kinesiology and Nutrition, including strong potential for successful collaboration with current faculty members (e.g., Drs. Motl, Oddo, and Baynard). This department would be an ideal academic home for me, and I am thrilled with the opportunity to apply for a faculty position.

In the classroom, I am prepared to teach a variety of kinesiology classes (e.g., exercise physiology and exercise testing/prescription), as well as methodologically-focused courses, including applied statistics and research methods. I have specific experience teaching advanced quantitative research methods at the graduate level, and I am also interested in developing a course on computational research methods, which would equip graduate students for success in the age of big data. My ultimate aim in the classroom is to help all students connect to the material, and the experience of learning it, in ways that fuel their short-term and long-term success.

Thank you for considering my application and potential contribution to the faculty. My curriculum vitae is enclosed along with the requested documents and contact information for Drs. Greg Welk, Scott Crouter, and Jordan Carlson. They are prepared to write letters of recommendation for me if requested. Please let me know if I can provide you with any additional information, and I wish you the best in your search.

Sincerely,

Paul R. Hibbing, Ph.D.
515.460.1463 | prhibbing@cmh.edu

University of Illinois Chicago Campus

Faculty Employment Application

The University of Illinois is an Affirmative Action/Equal Opportunity Employer

Personal Data

Position Applying for		Open-rank, Tenure-Track Faculty Positions - Kinesiology and Nutrition	
First name Paul	Middle	Last Name Hibbing	Suffix
Mailing Address 418 NE 55th St			
City Kansas City	State MO	Postal Code 64118	
County	Country United States		
Home Phone 5154601463	Work Phone 5154601463		
Cell Phone 5154601463	Email prhibbing@cmh.edu		

Are you legally authorized to work in the U.S.? Yes No Not Currently

References

Greg Welk
103E Forker Bldg, 534 Wallace Rd, Ames, IA, IA 50011-4008
5152943583
Professor, Barbara E. Forker Professor i
Iowa State University
gwelk@iastate.edu
Professional Reference

Jordan Carlson
1A00.35 Don Chisholm, 610 E 22nd St, Kansas City, MO 64108
8162349240
Associate Professor
Children's Mercy Kansas City
jacarlson@cmh.edu
Professional Reference

Scott Crouter
HPER 343, 1914 Andy Holt Ave, Knoxville, TN 37996-2700
8659741272
Associate Professor
The University of Tennessee, Knoxville
scrouter@utk.edu
Professional Reference

Relatives

Relative Name	Relationship	Department of Relative
---------------	--------------	------------------------

Are you or have you ever been employed by the University of Illinois? Yes No

I certify that to the best of my knowledge the information provided to the University of Illinois in my application and attached documentation is true and complete. I understand that false answers, statements or omissions of any information requested here shall be sufficient grounds for disqualification from employment or immediate termination of employment.

I understand that as a condition of my employment I may be required to undergo a medical examination and/or fitness to work assessment, including drug testing.

I give the University of Illinois permission to investigate my past educational record, criminal history background, employment history and related activities releasing persons, companies or agencies supplying such information from liability. Additionally, the University may verify whether I am prohibited from participation in federal or state health care programs due to fraud, abuse or misconduct. This participation extends to all mandated governmental exclusion listings. By submitting this application, I understand that my inclusion on a state or federal exclusion list may invalidate any offer of employment or require my immediate termination of employment.

Submitting this application to the University of Illinois does not obligate the University of Illinois, the State Universities Civil Service System, or any institution or agency served by it nor does it indicate that there are positions open.

Acknowledgement Received : March 26, 2022 11:40 PM
Paul Hibbing
User Name: phibbing

CONTACT INFORMATION FOR REFERENCES

➤ **M.S. Mentor: Gregory J. Welk, Ph.D.**

Professor

Iowa State University

Department of Kinesiology

Address: 103E Forker | 534 Wallace Rd | Ames, IA 50011-4008

Phone: 515-294-3583

Email: gwelk@iastate.edu

➤ **Ph.D. Mentor: Scott E. Crouter, Ph.D.**

Associate Professor

The University of Tennessee, Knoxville

Department of Kinesiology, Recreation, and Sport Studies

Address: HPER 343 | 1914 Andy Holt Ave | Knoxville, TN 37996-2700

Phone: 865-974-1272

Email: scrouter@utk.edu

➤ **Postdoctoral Mentor: Jordan A. Carlson, Ph.D.**

Associate Professor and Director of Community-Engaged Health Research

Children's Mercy Kansas City (joint appointment: The University of Missouri Kansas City)

Center for Children's Healthy Lifestyles & Nutrition

Address: 1A00.35 Don Chisholm | 610 E 22nd St | Kansas City, MO 64108

Phone: 816-234-9240

Email: jacarlson@cmh.edu

Recruitment Sources

Survey (STEP 1 OF 1)

How did you learn about this opening?
Job Posting, The Chronicle of Higher Education

STATEMENT OF ACCOMPLISHMENTS AND FUTURE PRIORITIES IN RESEARCH

1. Background

I am currently a postdoctoral fellow in the Center for Children's Healthy Lifestyles & Nutrition at Children's Mercy Kansas City. I am a physical activity methodologist by training, having been mentored throughout my career by NIH-funded investigators at three primary institutions (**Table 1**). My background is especially strong in the usage, testing, and enhancement of research-grade wearable physical activity monitors. This is a highly relevant area that has been instrumental in establishing my track record of interdisciplinary research, which includes publications with more than 100 co-authors in 14 states (plus the UK, Canada, and Denmark), spanning topics from survey calibration to energy balance assessment in time-restricted eating interventions. Since 2017, I have published more than 30 peer-reviewed papers, many of which have been in leading journals such as *Med Sci Sports Exerc* (impact factor: 5.411), *Am J Prev Med* (5.043), and *Int J Obes* (5.004). In addition to my publications, I have released half a dozen software packages for the R statistical programming language through my unique blend of expertise in exercise physiology and data science. These packages have helped me to streamline my own research as well as the research of others in my area. During my postdoctoral fellowship, I attended a 60-hour intensive training program through the University of South Carolina, where I received instruction and advice from leading faculty at NIH, CDC, and universities across the country. The program included a strong emphasis on maximizing the fundability of my proposed line of research, and I was encouraged by the feedback I received. In this statement I will briefly lay out my accomplishments and goals, as well as the impact of my research.

Table 1. History of mentorship by NIH-funded scientists, all of whom I am continuing to collaborate with.

Years	Mentor (Level)	Institution
2013-2016	Greg Welk (B.S/M.S.)	Iowa State University
2016-2020	Scott Crouter (Ph.D.)	University of Tennessee, Knoxville
2020-present	Jordan Carlson (Postdoctoral, primary)	Children's Mercy Kansas City
2020-present	Robin Shook (Postdoctoral, secondary)	Children's Mercy Kansas City

2. Accomplishments

My prior research has moved the field forward in three main ways. The related publications, grants, and software are listed in my curriculum vitae.

- Development of novel computing approaches for physical activity assessment using wearable devices. A substantial portion of my work has been devoted to developing innovative methods for predicting physical activity outcomes from sensor-based wearable devices (e.g. accelerometers). For my master's thesis, I developed four youth-specific adaptations of an accelerometer model known as Sojourn. The adaptations corresponded to different combinations of data type (raw acceleration units, or proprietary values known as activity counts) and wear location (hip or non-dominant wrist). Each Sojourn model included an algorithm to identify "Sojourns" (i.e., periods of homogeneous movement patterns), a neural network that made two activity intensity predictions, and a hand-built decision tree to harmonize the neural network predictions and original signal into a final estimate. During my doctorate research, I published some of the first models to incorporate cooperative sensor fusion of accelerometer, gyroscope, and magnetometer data for predicting energy expenditure in adults. The models had a "two-regression" formulation whereby activities were first pre-classified as sedentary behavior, intermittent activity, or ambulation, with energy expenditure values then being determined uniquely for each category (i.e., using a static value for sedentary behaviors, and separate regression equations for the other two categories). More recently, I have been contributing to efforts on NIH R01DK114945 (PI: Natarajan) to develop deep learning models for predicting posture with hip-worn accelerometers. These models are being calibrated for different participant populations, using a hybrid architecture of convolutional neural networks and bi-directional long short-term memory networks. My independent work has also recently contributed to advancing the science of sedentary behavior assessment through the development of "sedentary profiles", which present a robust and interpretable approach to assessing sedentary accumulation patterns (e.g., in prolonged bouts).
- Promotion of standardization and innovation in the analysis of physical activity data. Another focus of my work has been to identify and resolve common problems related to analyzing physical activity data. In some cases, this has involved developing or promoting new analytic approaches. For example, I co-authored a widely-cited paper (Google Scholar h > 100) that has popularized equivalence testing as a statistical mainstay for validation studies. I also developed a method for evaluating how well dynamic

segmentation algorithms perform, which overcame previously unaddressed limitations of the conventional analytic metrics for such algorithms (see **Figure 1**). More recently, I have developed a bout detection algorithm (under review) that uses unsupervised data mining to account for brief interruptions in a more robust way than prior algorithms have done.

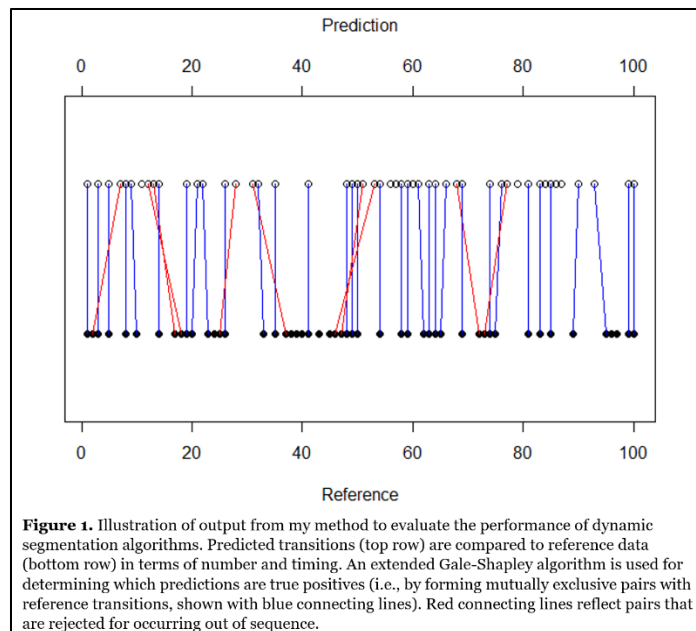


Figure 1. Illustration of output from my method to evaluate the performance of dynamic segmentation algorithms. Predicted transitions (top row) are compared to reference data (bottom row) in terms of number and timing. An extended Gale-Shapley algorithm is used for determining which predictions are true positives (i.e., by forming mutually exclusive pairs with reference transitions, shown with blue connecting lines). Red connecting lines reflect pairs that are rejected for occurring out of sequence.

➤ Dissemination of new methodologies and techniques. In physical activity measurement, many new and sophisticated techniques are being reported in the literature. However, these typically have low uptake among end-users (e.g., interventionists and epidemiologists) because they are not disseminated in ways that are easy to use. I am committed to streamlining my own workflows using advanced automation techniques, and I am equally committed to providing tools that help others do the same. I have most notably demonstrated this commitment by releasing a variety of software packages for the R statistical programming language. My packages are designed to standardize and simplify the performance of common tasks in physical activity research, such as reading ActiGraph sensor data files (*AGread*), implementing different types of models (*TwoRegression*, *Sojourn*), or other miscellaneous tasks such as making Bland-Altman plots and running paired equivalence testing (*PAutilities*). I am also advancing data science in the field through my efforts with the Free Living Activity Study for Health. I am the lead data manager for that study, including the open access portions we have made available on GitHub. As part of my role on the study, I have presented and published on effective data management, and I plan to continue doing so.

The above accomplishments have positioned me for long-term success as an investigator in physical behavior research. I am able to work sustainably at a high level in my own research, and I have also built a strong reputation as a collaborator and educator to help others do the same. I believe these qualities align strongly with what is being sought in the Kinesiology and Nutrition posting.

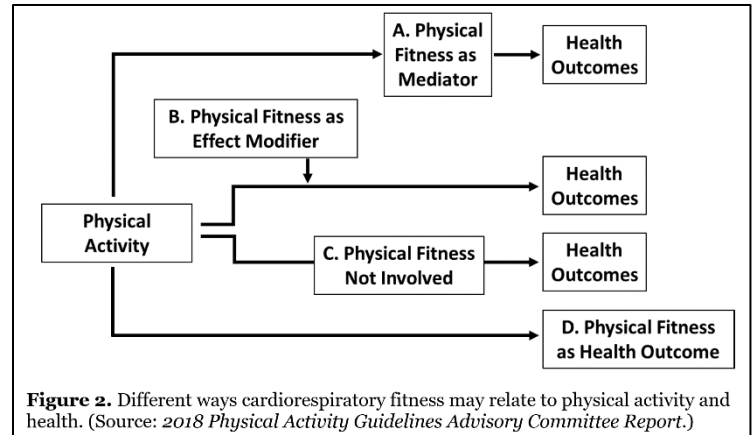
3. Goals: Research Program

In addition to ongoing work focused on physical activity measurement (including potential opportunities to collaborate with Dr. Motl), I am interested in establishing research lines in the following areas:

- Sleep Assessment. I am currently helping to lead a collaborative pilot study between the Carlson lab and the Children’s Mercy Sleep Clinic. The study is focused on evaluating a new sleep detection algorithm for a thigh-worn accelerometer called activPAL. We will compare the algorithm against gold standard polysomnography from overnight sleep studies in the Sleep Clinic, allowing us to evaluate its criterion validity in a pediatric sample. Alongside this effort, we are collaborating on secondary data analyses with members of the Colorado Nutrition Obesity Research Center (University of Colorado, Anschutz Medical Campus) to validate the algorithm’s free-living performance against a silver standard (Actiwatch). I am leading these analyses, and I was able to present our preliminary findings in a virtual poster at the 7th International Conference on Ambulatory Monitoring of Physical Activity and Movement. I have also submitted a manuscript that will facilitate our ongoing sleep research through development of a novel algorithm to recognize intermittent overnight sleep periods. (The same algorithm will benefit other areas of accelerometry as well.) The team and I anticipate this work becoming an R01 submission in the coming years.
- Occupational Physical Activity and Cardiovascular Versus Glycemic Health. During my fellowship, I have been laying groundwork for research focused on the health impacts of occupational physical activity and health, especially among those of Hispanic/Latino ethnicity. This work is primarily moving forward in collaboration with researchers in the scientific network of the population-based, multi-institute, and longitudinal Hispanic Community Health Study/Study of Latinos. I am especially interested in the potential for occupational activity to have beneficial effects in some areas (e.g., glycemic health) and not

others (e.g., dyslipidemia). I am also interested in the use of emerging tools for ambulatory blood pressure monitoring to look more closely at how occupational factors (e.g., stress and activity levels) interact with blood pressure and hypertension in real time. I plan to pursue an RO3 application on this topic as soon as I start a faculty position. My interest in occupational physical activity could potentially lead to fruitful collaborations with Dr. Oddo.

- **Health Interplay of Physical Activity and Physical Fitness.** I am also interested in starting to investigate the ways physical activity and physical fitness (particularly cardiorespiratory fitness) interact to influence health. This was a gap outlined in the 2018 Physical Activity Guidelines Advisory Committee Report (**Figure 2**), and it is an area I was encouraged to pursue when I discussed it with members of the Advisory Committee in South Carolina. I am especially interested in the influence of individual factors (e.g., fitness trainability and relative intensity) in moderating the known health impacts of physical activity and physical fitness. Issues of individuality are increasingly relevant considering the growing focus on precision medicine, and I believe my prior training and methodological mindset will strongly position me to advance the science in this area. I believe my interest in this area could synergize well with Dr. Baynard's work and lead to additional collaborations.



4. Goals: Outreach, Mentorship, and Diversity

Although I grew up in a college town (Ames, IA), my upbringing did not include meaningful exposure to research or its significance. It was revolutionary for me when, as a junior in college, my academic advisor mentioned graduate school as something I should pursue. Although it was a simple statement, it was profound for me because it revealed an exciting world I would not otherwise have fallen into. That seminal experience now fuels my desire to provide similar exposure for future scientists, especially those from underrepresented backgrounds.

To increase exposure, I am interested in developing programs (and participating in existing programs) that allow young people to get involved in science and explore related career options. I believe these exposures are needed before the college years, ideally in high school. Recently, I applied for a spot in a program along this line, i.e., the Summer Training in Academic Research (STAR) 2.0 program at Children's Mercy Kansas City. STAR will allow me to mentor five high schoolers from underrepresented backgrounds during a six-week program in which we complete a research project together, culminating in manuscript submission. As a faculty member, I plan to continue seeking out opportunities like this.

In addition to promoting research exposure, I am increasingly passionate about providing training and mentorship for graduate students and postdoctoral fellows. As I look to the future, I view these as crucial activities for ensuring sustainable progress in our field, with a key goal being to increase the diversity of the scientific workforce and professorate. Along that line, I intend to apply for diversity supplements on all qualifying grant awards I receive. I am also committed to pursuing formal training to become the best mentor I can, ensuring I am fully equipped to help my mentees succeed.

5. Summary of Research Impact

My research has a range of direct and indirect impacts. Directly, my work informs activity-related guidance that clinicians and health experts provide to the public (especially in the form of federal physical activity guidelines). In particular, there is a need for specific guidance related to occupational physical activity, but the evidence base is currently too sparse to support such recommendations. Indirectly, my work mobilizes other researchers to maximize their own impact. This occurs particularly through the tools I share to facilitate research involving big data, which is rapidly becoming an essential element of progress in our area. Overall, I am positioned to make important contributions to science and society, and I am very excited about the possibility of doing so as a faculty member in the Department of Kinesiology and Nutrition.

COMMITMENT TO TEACHING AND STUDENT MENTORSHIP

Teaching and student mentorship are core pillars of my professional mission. I am highly motivated by the opportunity to train future professionals and scientists whose impact will far exceed what I can achieve alone. I am particularly enthusiastic about serving individuals from underrepresented backgrounds, whose presence is sorely needed for progress in science and society. Throughout my graduate and postdoctoral training, I have been involved in teaching and mentorship in both formal roles (e.g., teaching assistantships in kinesiology labs and a course on quantitative research methods) and informal ones (e.g., facilitating study sessions with my peers and helping B.S. and M.S. students carry out their research projects). My experiences have reinforced my commitment to teaching and mentorship and given me valuable insights that shape my approach and philosophy. In particular, I have consistently observed that students and mentees learn the most when they have some form of personal connection to what they are working on. Therefore, my goal is to promote the discovery and enrichment of those connections, and to use them as a catalyst for the rest of the learning process. This goal shapes my philosophy and approach in four key areas:

- *Foundation Building.* When I first meet students or mentees, I begin by engaging them in discussion about their long-term goals. Those goals may be clear-cut or uncertain, but my intent is always the same: First, to hear where the learners are coming from, so I can begin tailoring my delivery; and second, to get each learner thinking about how they can use the upcoming experience as a stepping stone along their unique path to success. These outcomes are relevant for all learners (again, not just those with clear-cut goals), which makes the conversation comfortable and inclusive for everyone. As a result, it produces an excellent foundation for the learning that follows. In the role of course instructor, my plan is to build on that foundation by repeatedly assigning a written exercise (1-2 sentences), in which students envision how the course might impact them going into the future. For some, the impact will be content-related, while for others it may relate to something they learn about themselves or their lives (e.g., how to persevere when something does not come naturally). The important thing will be that the assignment helps each student find something personally meaningful that drives their continued engagement in the course.
- *Delivery.* My delivery depends on the topic and setting, as well as on the unique needs of my students and mentees. Currently, my main techniques in the classroom are conversational presentations, interactive tutorials, and practical exercises. Outside the classroom (e.g., during office hours or help sessions for student research), I use various techniques, especially when answering questions. For conceptual questions, my general approach is to try different explanations until one of them “clicks” for the learner. I do this using a mix of verbal and visual communication, which has proven very effective over the years. For practical questions, I treat them as if I were the one asking, and I work together with the learner to find the answer. Along the way, I balance watching, doing, and discussing to help the learner pinpoint key areas they need to work on. In all contexts, my use of varied delivery ensures every learner can connect with the material in a way that fosters their success.
- *Evaluation.* I believe evaluation should enhance learning, not interrupt it. When I was a student and mentee, many of my richest learning experiences came through well-designed evaluations, and I want to provide the same benefit for my own students and mentees. In my experience, transparency and rigor are the keys to successful evaluation. Learners must be shown a path to success that is exceedingly clear, yet only traversable with great effort. When that kind of system is in place, learners begin to see evaluations as opportunities to solidify their learning and gain confidence in their mastery. This is a powerful perspective that breeds engagement in a part of the learning process that is crucial and rewarding, yet often overlooked. As an evaluator, my approach will be to develop context-specific evaluations using whatever format (e.g., exam, essay, or project) yields maximum transparency and rigor for the context in question.
- *Continual Growth.* While I am confident in the foundations of my current teaching and mentorship philosophy, I know there will always be room for improvement. I am committed to that continual growth, and I fully expect to make regular adjustments to my approach throughout my career. Wherever possible, I intend to share this process with my students and mentees, as an encouragement that I am growing alongside them, and as an example of attitudes I hope they will adopt for themselves in the classroom, the lab, and ultimately the workplace. A teacher’s example is one of the most powerful things for a learner to connect with, and I view continual growth as a key area in which my example can have its greatest impact.

Together, my teaching activities promote holistic growth for every learner. I believe this prepares them to make a positive difference in the world, and I am eager to play my part in the process. I am passionate about teaching and mentorship, and I would be thrilled to apply that passion in service of students and mentees in the Department of Kinesiology and Nutrition.