BIOGRAPHICAL SKETCH

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NAME: Lohse, Keith R.

eRA COMMONS USER NAME (credential, e.g., agency login): keithlohse

POSITION TITLE: Assistant Professor, College of Health, University of Utah

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Idaho State University, Pocatello, ID	BS	05/2007	Psychology
University of Colorado, Boulder, CO	MA	05/2009	Cognitive Psychology
University of Colorado, Boulder, CO	PhD	05/2012	Cognitive Neuroscience
University of British Columbia, Vancouver, BC	Postdoctoral Fellow	07/2014	Rehabilitation Science

A. Personal Statement

I am currently an assistant professor in the Department of Health, Kinesiology, and Recreation, with an affiliate appointment in the Department of Physical Therapy and Athletic Training at the University of Utah. My research focuses on understanding interactions between patients and the therapy they receive in order to individualize and optimize therapy. Ultimately, understanding these Patient x Therapy interactions will create more efficient, individualized rehabilitation to improve the quality of life for individuals with disabilities.

Addressing these questions requires advanced analytical tools to control for the temporal nature of the data and other statistical dependencies (e.g., time within patients and patients within different study sites). To that end, I have specialized in advanced statistical modeling techniques (e.g., linear and nonlinear multi-level models; causal inference models in observational data) to understand the temporal dynamics of learning and rehabilitation. By applying these models in basic research on learning and clinical research in patient populations, we can ultimately create more efficient, individualized rehabilitation approaches and improve the quality of life for individuals with disabilities.

a) Pathania, A., Leiker, A.M., Euler, M., Miller, M.W., & Lohse, K.R. (2019). Challenge, motivation, and effort: Neural and behavioral correlates of self-control of difficulty during practice. *Biological Psychology*, 141, 52.
b) Hayward, K.S., Lohse, K.R., Bernhardt, J., Lang, C.E., & Boyd, L.A. (2018). Characterizing arm recovery in people with severe stroke (CARPSS): Protocol for a 12-month observational study of clinical, neuroimaging, and neurophysiological biomarkers. *British Medical Journal: Open*. http://dx.doi.org/10.1136/bmjopen-2018-026435
c) Peterson, D., Lohse, K.R., & Macini, M. (2018). Relating anticipatory postural adjustments to step outcomes during loss of balance in people with Parkinson's disease. *Neurorehabilitation and Neural Repair*, 32, 887-898.
d) Lohse, K.R., Bland, M., & Lang. C.E. (2016). Quantifying change during outpatient stroke rehabilitation: A retrospective regression analysis. *Archives of Physical Medicine & Rehabilitation*, 9, 1423-1430. doi: 10.1016/j.apmr.2016.03.021

B. Positions and Honors

Positions and Employment

2012 - 2014	Postdoctoral Research Associate, University of British Columbia, CANADA, Vancouver, BC.
2014 - 2017	Assistant Professor, School of Kinesiology, Auburn University, USA, Auburn, AL
2017 – Present	Assistant Professor, Department of Health, Kinesiology, and Recreation, University of Utah, USA, Salt Lake City, UT
2017 – Present	Adjunct Assistant Professor, Department of Physical Therapy and Athletic Training, University of Utah, USA, Salt Lake City, UT

Honors

2011	Co-recipient of the Dozier Award for academic excellence among doctoral students from the Department of Psychology and Neuroscience at the University of Colorado, Boulder.
2017	Recipient of the Early Career Distinguished Scholar Award from the North American Society for the Psychology of Sport and Physical Activity (NASPSPA).

Other Experience and Professional Memberships

2009 – Present	Member, North American Society for the Psychology of Sport and Physical Activity.
2013 – Present	Member, American Society for Neurorehabilitation.
2014 – Present	Editorial Board Member, *Journal of Motor Learning and Development*
2018 – Present	Associate Editor (Measurement and Evaluation), *Research Quarterly in Exercise and Sport.*

C. Contributions to Science

Individual Differences in Stroke Rehabilitation:

An important question concerning rehabilitation science is understanding dose-response relationships in physical and occupational therapy. That is, how many repetitions of an exercise (dose) are required to induce neuroplastic changes or behavioral improvements (response)? Many labs have been working on this problem using a variety of experimental and epidemiological approaches that span wet-lab research in animals to detailed investigations of functional recovery in human participants. Importantly, our work has shown how individual differences in both the neurological status of the patient and the content of therapy shape these dose-response curves.

a) Hayward, K.S., Lohse, K.R., Bernhardt, J., Lang, C.E., & Boyd, L.A. (2018). Characterizing arm recovery in people with severe stroke (CARPSS): Protocol for a 12-month observational study of clinical, neuroimaging, and neurophysiological biomarkers. *British Medical Journal: Open*. http://dx.doi.org/10.1136/bmjopen-2018-026435
b) Hayward K.S., Schmidt, J., Lohse, K.R., Bernhardt, J., Boyd, L.A. (2017). Are we armed with the right data? Pooled individual data review of biomarkers in people with severe upper limb impairment after stroke. *NeuroImage Clinical*, 13, 310-319.
c) Lohse, K.R., Bland, M., & Lang. C.E. (2016). Quantifying change during outpatient stroke rehabilitation: A retrospective regression analysis. *Archives of Physical Medicine & Rehabilitation*, 9, 1423-1430. doi: 10.1016/j.apmr.2016.03.021
d) Lang, C.E., Lohse, K.R., & Birkenmeier, R.L. (2015). Dose and timing in neurorehabilitation: Prescribing motor therapy after stroke. *Current Opinion in Neurology*, 28, 549-555.

Rehabilitation Informatics:

Currently, there are problems in the information architecture of physical medicine and rehabilitation. Heterogeneity in patient populations, small samples sizes, and variability in interventions all create barriers to effectively integrating and interpreting results between different studies. Collaborating with primary researchers, we have been able to engage in significant meta-scientific work to establish the reliability of different behavioral and neurophysiological measures, apply sophisticated statistical models to rehabilitation in

distinct neurological populations, and create the *C*entralized *O*pen-*A*ccess *R*ehabilitation database for *S*troke (SCOAR). SCOAR is a database of summary statistics cross-indexed with methodological characteristics and patient characteristics from published RCTs. Many of these projects are recent, so it is difficult to gauge the effect this meta-scientific research has had on the research community. However, the first iteration of the SCOAR database is online, and since its publication in 2016, the digital publication has been viewed 2,600+ times and 10+ researchers have contacted me to use the database for power calculations in designing their own studies.

a) Peterson, D., Lohse, K.R., & Macini, M. (2018). Relating anticipatory postural adjustments to step outcomes during loss of balance in people with Parkinson's disease. *Neurorehabilitation and Neural Repair*, 32, 887-898.
b) Lohse, K.R., Pathania, A., Wegman, R.* Boyd, L.A., & Lang, C.E. (2018). On the reporting of experimental and control therapies in stroke rehabilitation trials: A systematic-review. *Archives of Physical Medicine & Rehabilitation*, 99, 1424-1432.
c) Mohabbati-Kalejahi, N., Alamdar Yazdi, M.A., Megahed, F., Schaefer, S.Y., Boyd, L.A., Lang, C.E., & Lohse, K.R., (2017). Streamlining science with structured data archives: Insights from stroke rehabilitation. *Scientometrics*, 113, 969-983.
d) Lohse, K.R., Lang, C.E., & Boyd, L.A. (2014). Is more better? Using meta-data to explore dose-response relationships in stroke rehabilitation. *Stroke, 45,* 2053-2058.

Individual Differences in Skill Learning:

Related to my applied work in rehabilitation, I also do more basic work on the neurophysiological processes that underlie skill learning and training. This basic science focuses on many of the same issues that make studies of neurological rehabilitation difficult: time-series data, large individual differences, and the dynamic nature of both the learner (patient) and practice (therapy). Insights from this basic work (i.e., very different mechanisms underlie short-term adaptation and long-term learning) inform the design of applied studies and our approach to neurorehabilitation (i.e., learning is more related to compensatory recovery than it is to "true" recovery of damaged neural pathways).

a) Lohse, K.R., Miller, M.W., Daou, M. Valerius, W., & Jones, M.C. (under review). Exploring the effect of engagement on category learning: Aggregate and single-trial analyses of the reward positivity component. *Biological Psychology*.
b) Leiker, A.M., Pathania, A., Miller, M.W., & Lohse, K.R. (in press). Exploring the effects of self-controlled practice on neurophysiological correlates of engagement, motivation, and motor skill learning. *Journal of Motor Learning and Development.*
c) Pathania, A., Leiker, A.M., Euler, M., Miller, M.W., & Lohse, K.R. (2019). Challenge, motivation, and effort: Neural and behavioral correlates of self-control of difficulty during practice. *Biological Psychology*, 141, 52.
d) Meadows, C.C., Gable, P.A., M., Lohse, K.R., & Miller, M.W. (2017). Motivation and motor cortical activity can independently affect motor performance. *Neuroscience*, 339, 174-179.

D. Research Support

Ongoing Research Support

CoH Seed Grant — Fino (PI) — 2019
University of Utah; College of Health Pilot Grant Program
Title: Neural activity of balance recovery following concussion.
Aims: Identify sources of compensatory cortical activation in the maintenance and recovery of balance in individuals with mild traumatic brain injury.
Role: Co-Investigator (0 calendar months/year)

UUISMS Grant — Williams (PI) — 2018-2021
University of Utah Institute of Sports Medicine & Science Grant
Title: Developmental pathways in alpine skiing: Exploring factors that influence superior performance, injury risk/recovery, and burnout
Aims: Statistically model the development pathways of elite skiers, focusing especially on the factors (both in the structure of practice and the disposition of the individual) associated with improved performance and reduced injury.
Role: Co-Investigator (0 calendar months)

PTJ 153330 — Boyd (PI) — 2017-2022
Canadian Institutes of Health Research/Instituts de recherche en santé du Canada
Title: Characterizing Arm Recovery in People with Severe Stroke (CARPSS).
Aims: The main aims of the proposed research are to: 1) track individuals with severe upper limb disability across the first year post stroke to determine which factors best predict recovery of function, 2) establish a definition of meaningful recovery using data from stroke survivors themselves in combination with clinical and brain based measures, and 3) test a novel algorithm that predicts the degree of functional recovery.
Role: Co-Investigator (0 calendar months)

Completed Research Support

IGP Project # 170138 — Lohse & Miller (Co-PI) — 2017-2018
Auburn University Internal Grants Program
Title: Improving acquisition of manual-wheelchair skills: An EEG study using motor learning principles.
Aims: This study manipulated participants' expectations during practice (i.e., training with the expectation of having to teach the skill versus training with the expectation of being tested on the skill) in learning to navigate using a manual wheelchair. This study was also novel in the mobile collection of EEG data during manual wheelchair use.
Role: Co-Principle Investigator (with Matt Miller; 0 calendar months)

FAA 16-C-TTHP-AU — Sefton (PI) — 2016-2018
Federal Aviation Administration – Center for Excellence for Technical Training and Human Performance
Title: Exploring the use of gamification for training.
Aims: Currently, the FAA faces significant turn-over in air traffic controllers (ATCs). As such, the development of effective and efficient methods for training new ATCs is critical. The goal of this project was to create electronic training modules, based on game-design principles, to train novices in basic ATC skills. This module served as a proto-type for the gamification of vocational training in other areas.
Role: Co-Investigator (0 calendar months)