

Board of Directors Spotlight: Dr. Keith Lohse

We're delighted to highlight the work of ASNR Board Member and our current Education Committee Chair Keith Lohse, PhD, PStat. Dr. Lohse is Associate Professor of Physical Therapy and Neurology at Washington University School of Medicine in St. Louis. In the interview below, he shares more about himself, his current research, and his experiences as an ASNR Member and a Member of our Board.



1) How did you get interested in science, and what steps did you take to get to your current role?

I've always been a very curious person and I get a lot of joy from figuring things out. As a kid, I credit a lot of this to my parents who encouraged me to be creative, helped me build things, and generously allowed me to take some things apart. Going into college, I didn't really plan to be a scientist. I loved biology and psychology, but my dream at the time was making entertaining cartoons about science and math (I still enjoy doodling on the side!). From my first statistics course though, I got really hooked on the idea of how we can use mathematical tools to make decisions in science. My focus was still on neuroscience (I majored in psychology, not statistics), but as time went on, I became more and more focused on research methods and data analysis. I went to graduate school in cognitive psychology to study human learning. While there, I was a teaching assistant for statistics labs for five years and learned a lot about study design, multivariate statistics, longitudinal data, missing data, etc. I am glad to say that near the end of my PhD, I really started to figure out what I wanted to do with my life, and I turned my focus away from more basic science to the more applied world of rehabilitation science. Since then, I have developed a unique niche as a "team scientist" contributing my methodological expertise to numerous research projects, providing statistical reviews for leading journals in our field, and teaching computer programming/data management in rehabilitation.

2) What is the focus of your current research, and what are some of your key findings?

I generally break my research focus down into three areas:

- (1) Ontology and measurement in neurorehabilitation (i.e., are we measuring what we think we are measuring/should be measuring?)
- (2) Working with longitudinal and time-series data (i.e., rehabilitation is fundamentally about changes in a person's ability over very long time scales. How can we efficiently design trials and collect data for studies that span years?)

(3) Data Use, Re-Use, and Rehabilitation Informatics. As with many fields, rehabilitation has seen astronomical growth in the amount and complexity of the data we produce. For instance, physiological data from EEG or accelerometry data from inertial sensors contain highly structured data (e.g., voltages or forces in discrete intervals of time) in very dense samples (e.g., 250-1,000 Hz for minutes or hours of recording). In contrast, electronic health records contain loosely structured data from millions of individuals, with complex data types that all have unique relationships to each other and may or may not be recorded over time. This means that researchers and their trainees are

facing increasingly large and complex datasets. In my research group, we want to give researchers the tools and training to work with their own data effectively. More than any single project, we want to make sure that data are **F**indable, **A**ccessible, **I**nteroperable (easy to combine with other data and use in different systems), and **R**eusable (FAIR) in rehabilitation science. As part of that effort, I am part of the educational leadership team for the Reproducible Rehabilitation (“ReproRehab”) program funded by the National Center for Medical Rehabilitation Research (NCMRR), and I collaborate with other researchers at WUSTL to harmonize and archive large research datasets.

3) Why did you decide to get involved with the ASNR Board of Directors?

I have been going to ASNR Annual Meetings since about 2013, and I have always loved the small, focused meeting full of such wonderfully collegial, smart, and motivated researchers. It is a great community to be a part of, and I owe a lot of my involvement to Dr. Catherine Lang (one my mentors). I first met Catherine through ASNR, and she helped me get more involved with the organization. When I was offered an opportunity to be a part of the Board of Directors, it felt like the perfect opportunity to give back, especially with respect to ASNR’s educational mission. It is a privilege to work with the next generation of neurorehabilitation researchers and help give them the tools they need to be successful.

FAST FACTS

FAVORITE BREAKFAST CEREALS

BREAKFAST CEREALS: CORN POPS OR CRACKLIN’ OAT BRAN

FAVORITE MOVIES

LAST CHANCE TO SEE BY DOUGLAS ADAMS; THE HALF-LIFE OF FACTS BY SAMUEL ARBESMAN

FAVORITE PLACES TO TRAVEL

MOUNTAINS! ESPECIALLY THE ROCKIES AND THE BLUE RIDGE MOUNTAINS

FAVORITE SCIENTIFIC JOURNALS TO FOLLOW

THE AMERICAN STATISTICIAN; NNR; STROKE; JOURNAL OF NEUROLOGIC PHYSICAL THERAPY

4) What do you enjoy most about being an ASNR Board Member?

Going to the conference! There are a lot of wonderful things about being an ASNR Board Member, but for me, the highlight is always attending the in-person conference. I think the sign of a good conference is that it recharges you, rather than feeling like a slog. I look forward to the conference every year, and I always leave it feeling intellectually refreshed (and usually with a couple of great new ideas!).

5) What do you see as the biggest challenges or areas of opportunities in neurorehabilitation research right now?

That's a tough call. There are a lot of exciting frontiers in genomics, proteomics, and neurostimulation that could be revolutionary. At a "meta" level though, I think we really need to change the way we do research to have confidence in the reproducibility and generalizability of these advances. A lot of people talk about "precision medicine" or "personalized medicine", but at the moment I do not think we are well-equipped to do those kinds of studies. Fundamentally, making those kinds of claims will require huge amounts of data from a huge number of people. And, although as a field we are heading in that direction, it will require integration and cooperation between research labs on a scale that we have never seen before. So, I am excited to see the field starting to move in that direction, but at the same time, it is a big challenge – it's a tough sell to say "hold on, we need fewer, bigger, and higher quality studies" in an academic world that incentivizes frequent, fast, "eye-catching" work. Innovation is great, but only if it actually can be replicated and generalized.