

Career Pathways: Dr. Rachel Hawe, PT, DPT, PhD

As a high school student, Dr. Rachel Hawe wasn't sure what she wanted to do in the future. While she enjoyed math and science, she had little exposure to engineering and couldn't see herself in the traditional engineering roles she was aware of. That changed when a friend mentioned biomedical engineering. She was initially drawn to the idea of designing prosthetics and was excited to apply her skills in math and science to medical applications.



Dr. Hawe started down the path of biomedical engineering at the University of Rochester in Rochester, NY, with a concentration in biomechanics. Soon after starting her first year of college, her academic advisor told her about a job opening for an undergraduate research assistant in the Department of Neurobiology and Anatomy. She joined the lab of Drs. Martha and Greg Gdowski and stayed there throughout her four years of college. This introduced her to what academic research was, and she started to realize that her interests were more aligned with neuroscience than pure biomechanics. She then had two additional undergraduate research experiences that exposed her to the field of rehabilitation. First, she participated in a National Science Foundation (NSF) Research Experience for Undergraduates (REU) summer program at Marquette University. She worked with Dr. Sandra Hunter in the Exercise Sciences program. From this experience, she learned that the research questions in physical therapy and rehabilitation were well aligned with her interests. Following this experience, her senior design project involved working with a physical therapist to design a device to detect partial weight bearing. This experience demonstrated the interconnection between physical therapy and engineering, and it planted the idea that she might one day want to become a clinician as well.

In the process of applying for graduate programs in biomedical engineering, Dr. Hawe came across the new dual degree program in physical therapy (DPT) and biomedical engineering (PhD) at Northwestern University. The program seemed to be a perfect fit both in terms of the research she could do and the opportunity to get clinical training. The DPT-PhD program at Northwestern consists of two years of PhD work including engineering coursework, followed by three years of the DPT, and then additional years to complete PhD research. For her PhD work, Dr. Hawe joined the lab of Dr. Jules Dewald and examined involuntary interlimb coupling in children and adults with hemiparesis. She greatly benefited from the depth of rehabilitation research being conducted at Northwestern and the strong community of faculty and graduate students. Dr. Hawe was fortunate to have a lot of freedom during her PhD to explore her research

interests and go down different paths. While her research direction shifted many times and led to frustration at different points along the way, she appreciated how she could truly develop as a scientist during her training, especially in terms of coming up with meaningful (and feasible) research questions. Her PhD was also where she started appreciating a lifespan approach to work in stroke, with her research including children with hemiparetic cerebral palsy (most commonly due to a stroke early in life) as well as individuals who had a stroke in adulthood.

The clinical training and experience Dr. Hawe received during her graduate work was also invaluable. While research can focus on a very specific area, the DPT gave her more breadth in her knowledge which has enriched her research and made her more well-rounded. Following her DPT degree, Dr. Hawe practiced clinically as a physical therapist in acute care and outpatient settings at Weiss Memorial Hospital. This experience kept her grounded in the day-to-day realities of clinical practice. Doing an engineering degree can often involve using the latest technologies, but working at an underserved community hospital reminded her of what was currently feasible and most needed in the “real-world.”

Following her PhD, Dr. Hawe moved to Calgary in Alberta, Canada, to complete a postdoctoral fellowship in Clinical Neurosciences under the mentorship of Dr. Sean Dukelow. A large focus of her postdoctoral work was to examine stroke recovery in the first six months post-stroke, using a large dataset collected in Calgary of robotic, clinical, and neuroimaging measures. This work introduced her to imaging methods including lesion symptom mapping techniques and analysis of white matter hyperintensities. She also collaborated with Dr. Adam Kirton to examine the interplay between bilateral movements, visuospatial attention, and executive function in children with perinatal stroke. During her time in Canada, she was an active member of the Canadian Partnership for Stroke Recovery, and she served as the co-chair of the National Trainee Association.

When it came time to apply for faculty positions, Dr. Hawe considered many different departments including biomedical engineering, physical therapy, and kinesiology, before ultimately finding her home in the School of Kinesiology at the University of Minnesota. While she feels fortunate to have secured a job, starting a faculty position in Fall 2020 was definitely a challenge. Her entire first year was remote, which presented challenges in starting a lab, teaching, and connecting with collaborators and resources across campus. Now in her third year, she is excited to see her lab up and running. Dr. Hawe directs the Neurorehabilitation Across the Lifespan (NeuRAL) Lab which is currently focused on understanding bilateral coordination impairments in both children with cerebral palsy and adults with chronic stroke, as well as investigating visual strategies

during upper limb movements in both populations. After the initial struggles from the pandemic, collecting data and seeing her students progressing on their projects is extremely rewarding.

Being in a kinesiology department has unique challenges and opportunities. The department serves a large number of undergraduates and has higher teaching loads (two courses per semester) than many types of departments. While teaching can certainly take a lot of time and effort, Dr. Hawe finds it exceedingly rewarding and complimentary to her research, even inspiring a new research direction. With the majority of her undergraduate students wanting to go on to physical or occupational therapy programs, Dr. Hawe enjoys the opportunity to mentor future clinicians at this early stage of their careers. She also recognizes the important role her undergraduate mentors had on shaping her career and wants to pay it forward.

Membership in the American Society of Neurorehabilitation (ASNR) has been key to Dr. Hawe's career path. The annual ASNR meetings are an invaluable way to see the latest in neurorehabilitation research and connect with colleagues. The career development webinars are extremely applicable to postdocs and junior faculty members. Dr. Hawe received sponsorship from ASNR to attend the Training in Grantsmanship for Rehabilitation Research (TIGRR) Workshop in 2021, which was also very beneficial. She is now enjoying serving on the Membership Committee to help make sure as many others are benefitting from ASNR membership as possible. "Meeting and learning from leaders in neurorehabilitation through different opportunities within ASNR has helped me continue to refine my research ideas and feel connected with this vibrant community of scientists."