

## ACOTUP Researcher Profile

**Name of researcher:** William (Bill) C. Miller, PhD, FCAOT

**Degrees and professional qualifications (including fellowships):**

Post-doc (Rehabilitation Sciences); PhD (Epidemiology & Biostatistics); MScOT; BSc OT

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**Area of research:** My research expertise/interests centre around the measurement, epidemiological understanding, and examination of interventions on mobility disability in adults, particularly on its influence on the participation of daily/social activities. Much of my work has focused on falls, balance and mobility self-efficacy. Recently I've focused on wheelchair use, training, wheelchair design, and e-health, or the use of tablets to provide mobility interventions.

**Research related awards and honors:**

- Canadian Association of Occupational Therapists Fellowship (FCAOT), CAOT (2010)
- New Investigators Career Scientist Award, Canadian Institutes of Health Research (CIHR) (2005-10)
- Salary Support, Post-doctoral fellowship, Michael Smith Foundation for Health Research (2001-04)
- University Honours, Recognition for research achievement, UBC (2001-03)
- Salary Support, Post-doctoral fellowship, Canadian Institutes of Health Research (2000-03)
- Governor General's Gold Medal, Univ. of Western Ontario (2000)
- Goldwin Howland Scholarship, Canadian Occupational Therapy Foundation (1998-99)
- Scholarship, ICBC Scholarship in Occupational Therapy, ICBC / UBC School of Rehabilitation Medicine (1989)

**Grants/funding history:**

- W.C. Miller, R. Routhier, J.J. Eng, C. H. Goldsmith, K. Best. (2013-15). Wheelchair Self-efficacy Enhanced training program to improve wheelchair use in older adults: The WheelSeeU feasibility study. CIHR Operating Grant (\$181,000)
- W.C. Miller, A. Mihailidis, A. Mackworth, L. Demers, R.L. Kirby, et al. (2009-15). Wheeled Mobility for Older Adults. CIHR emerging Team Grant (\$1.48 million).
- W.C. Miller, L. Boronowski, L. Demers, R. Kirby, S. Rowe, P. Rushton. (2013-14). Knowledge translation of a wheelchair skills program for rehabilitation clinicians: A feasibility study. CIHR Knowledge to Action (\$194,000).
- W.C. Miller, J.J. Eng, R. Woodgate, I. Mitchell, C. Goldsmith, E. Giesbrecht. (2012-14). Enhancing Participation in the Community by improving Wheelchair Skills (EPIC Wheels): A Feasibility Study. CIHR Open competition (\$120,000).
- W.C. Miller et al (2013-16). Evaluation of the WiiFit to enhance walking in older adults with lower limb amputation. CIHR Operating Grant (\$531,000).

**Research collaboration:** The CanWheel Emerging CIHR Team in Wheeled Mobility for Older Adults: I recruited this team of 16 investigators from across Canada to come together with a mandate to improve wheeled mobility for vulnerable older adults with mobility limitations. The diverse team consists of experts in the fields of biomechanics, computer science, engineering,

epidemiology, gerontology, occupational therapy, physiatry, and sociology representing 4 provinces and 6 academic institutions. Together we have developed a program of research spanning 5 key research projects to be conducted over a 6-year period. Put simply, our research will address: 1) how older adults use their power wheelchairs; 2) how power wheelchairs can be better designed through collaborative control (wheelchair user working in conjunction with the power wheelchair); and 3) how to better train individuals to use their power wheelchairs. We have also validated a Power Mobility toolkit to better measure important aspects of power wheelchair use including social participation and caregiver burden.

In this project 16 MSc, PhD, and post-doctoral trainees have contributed to the advancement of our mandate. Trainee involvement enriches the creative and research milieu. The CanWheel team has had the challenge (and opportunity!) of mixing trainees from very different academic backgrounds (e.g. occupational therapy and computer science). When done correctly the impact is powerful. As an example, exposing junior computer scientists and engineers to individuals with mobility disabilities provides the trainees with invaluable insights regarding the pragmatics of assistive technology use.

**What is the most important thing in mentoring graduate students?** I have mentored >25 research students since 2000. I can honestly say that I have learned as much from them as they have from me. Research trainees keep supervisors busy, grounded, up-to-date and creative. I view research training of these students as perhaps my most important educational contribution. I strive to weave the principles of andragogical learning to challenge and augment their analytic thinking, understanding and to promote movement towards independence. As an example, when faced with an obstacle I encourage and reinforce trainees to come to meetings with a series of solutions, and reasons to support their solutions. Moreover, I endeavor to use a variety of formats including online, small group and one-on-one sessions to enhance communication skills. These experiences encourage learners to take risks and push boundaries in their quest to become leaders in their clinical or research careers, which ultimately contributes to the well-being of society.

**Most significant publications:**

- Mortenson B, Miller WC, Miller-Polgar J. (2007). Measuring wheelchair intervention outcomes: The development of the Wheelchair Outcome Measure (WhOM). Disability and Rehabilitation, 2: 275-85.  
This manuscript outlines the development of a new outcome measure for clinical practice/research. The WhOM has been requested by clinicians and researchers from over 20 countries, translated into 3 foreign languages and used in over 10 trials to date. A 2008 publication in a leading rehabilitation journal indicated that the WhOM was the best measure of social participation for wheelchair users.
- Miller WC, Deathe AB, Speechley M. (2001). The prevalence and risk factors of falling and fear of falling among lower extremity amputees. Archives of Physical Medicine and Rehabilitation, 82(9):1031-7.

Requests for interviews (Biomechanics Magazine), articles in trade magazines (Rehabilitation Management) and invited manuscripts in special issue peer-reviewed journals and conference presentations (Ontario/Quebec Joint Amputee Conference 2002; American Orthotics and Prosthetics National Assembly (AOPA) 2009; International Society of Prosthetics and Orthotics 12<sup>th</sup>

World Congress 2007) have resulted. This paper has been cited over 180 times on Google Scholar and 106 times on Web of Science.

- Miller WC, Speechley M, Deathe AB, Koval J. (2001). The influence of falling, fear of falling and balance confidence on prosthetic mobility and social activity among individuals with a lower extremity amputation. Archives of Physical Medicine and Rehabilitation, 2001;82(9):1238-44.

The results of this paper have led funding agencies in the US to consider prevention of falling as a primary reason to fund advanced (smart) prosthetic devices and has led to the development of an amputee-specific, clinically oriented walk to determine functional mobility and predict falling among individuals with lower extremity amputation. This paper has been cited over 125 times on Google Scholar and 74 times on Web of Science.

**Tips would you give for new investigators:** Develop and cultivate mentorship relationships within your university and your research content area. Research is a team sport. Networking with an eye on creating partnerships will enable you to advance your program of research while contributing to the research programs of others. Ensure your research is relevant. Participate in every opportunity to contribute to tri-council planning. Make research trainees your priority by: 1) responding to their inquiries quickly; 2) providing incentives to build their careers (e.g. first author publication opportunities); 3) creating novel learning opportunities that will enhance trainee productivity (e.g. monthly publication productivity 'clubs'); and 4) make their learning challenging but also engaging. Learn to manage your time effectively and be prepared to sacrifice your creative efforts and energy particularly in the early years of your career. Embrace and never lose your passion for doing research.