Understanding propulsive shoulder forces and scapular kinematics during manual wheelchair use

We do not understand enough about how the interaction between different wheelchair configurations and the user affects forces acting on shoulder girdle structures. This is problematic because associated shoulder pain and inefficient propulsion is common and disabling for wheelchair users, who usually rely heavily on upper limb function for activities of daily living and recreation. Wheelchair users may spend years refining wheelchair configuration for optimal performance in a sports chair; however, much less time is afforded to the configuration of the more frequently used everyday wheelchair.

There has been a recent acceleration in high quality shoulder movement research, driven by improved tools and analysis methods for tracking movement – previously difficult as the shoulder is highly mobile in all three planes. We have assembled an inter-disciplinary team of experts, with complimentary expertise and technology that will enable us to accurately measure the forces and movements at the shoulder. Our novel proposal is to combine two approaches to accurately measure shoulder joint kinematics (movements) and kinetics (forces) during manual propulsion of everyday wheelchairs. This work will help establish a feasible and reliable method that can be employed to better understand how wheelchair configurations can be manipulated to prevent shoulder girdle pain and pathology.