Author Year Country Research Design Score Total Sample Size	Methods	Outcome
Richter et al. 2006 USA Post Test $N_{Initial}$=24; N_{Final}=23	**Population:** Mean age: 35.0 yr; Gender: males =18, females=6; Mean weight: 71.4 kg; Level of injury: paraplegia=22, spina bifida=2; Mean duration of w/c use: 16 yr; Chronicity=chronic. **Intervention:** Propulsion of personal wheelchair on a treadmill with varying inclines (level, 3°, 6°) and using a standardized uncoated handrim (SUH) and a high friction flexible handrim (HFH). **Outcome Measures**: Electromyographic data-maximum voluntary contraction, Total muscle exertion, Peak and total muscle exertion per push.	1. HFH decreased peak muscle activation and total muscle exertion. 2. An 11.8% reduction in peak muscle activation (p=0.026), and a 14.5% (p=0.016) reduction in total muscle exertion, were apparent with use of the HFH versus the SUH.
Richter & Axelson 2005 USA Post Test N=17	**Population:** Mean age: 37 yr; Gender: males=10, females=7; Injury etiology: SCI=16, spina bifida=1. **Intervention:** Part 1: Participants used their own manual wheelchair with their rear wheels replaced with the Variable Compliance Hand-Rim Prototype (VCHP) test wheels. Participants completed a mobility activity test course (uphill, downhill, slalom, level sprint, pushing and carpet) in three different hand rim compliance settings (ridged, C1, C2, C3); testing stopped once the participant found the hand rim compliance to be too soft. Part 2: Participants propelled their own manual wheelchairs with the rear wheels replaced with a propulsiometer on a treadmill for up to 5 min using each hand-rim condition (rigid, C1, C2, C3) for four grade/speed combinations with a 15 min rest period between each test combination. **Outcome Measures:** Peak hand-rim force, Metabolic demand and rate of loading at impact, Participant feedback related to acceptability of different hand rim compliance levels.	1. Participants felt that the use of the compliant hand rims did not compromise their ability to maneuver/control the wheelchair. 2. No participants found C1 too soft; C2 and C3 were too soft for 29% and 47% of participants, respectively; 24% felt the hand rim could be softer than C3. 3. C1 was the only hand-rim condition that had a statistically significant difference from rigid hand-rim for push angle (an additional 3.5° angle on 2% grade compared to the rigid rim). 4. Push angle, push frequency and recovery time tended to decrease with an increase in grade; push time increased with increasing grade 5. No statistically significant differences were found between the rigid hand rim and any of the other conditions (C1, C2 or C3) for peak resultant and in-plane resultant force relationships. 6. For all hand-rim conditions, the trend was an increasing peak hand-rim force as the grade increased. 7. No statistically significant differences were found between the compliant and rigid hand rims in terms of: 1) resulting peak wheel moment and estimated contribution of tangential force. 8. No significant differences were found for metabolic demand between the rigid and C3 hand-rims.