

**Power assist wheelchairs:  
a good alternative?**

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VRA Annual Congress 2012  
November 2<sup>nd</sup> 2012

**Power assisted wheelchair**

Powered wheelchair

Manual wheelchair

Upper extremity injury  
Insufficient arm strength  
Low cardio-pulmonary reserves  
Inability to maintain posture

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**Power assisted wheelchair**

- Power assist during push phase
- Motor at wheel axis
- Wheels fit on subjects own wheelchair frames

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**Power assist wheelchairs**

- Yamaha JWII / Quickie Xtender (Sunrise Medical)
- E-motion (Ulrich Alber GmbH)
- Delta Glide was available as the iGLIDE
- Wheeldrive (Handicare)

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**Review**

16 studies included

Upper extremity function

Activity

Participation

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**Body functions & structures**  
Reduce risk of arm overuse

Minimize extreme wrist positions and positions where the shoulder is prone to impingement

Reduce push frequency as well as forces necessary for propulsion

CULP-SCI Boninger 2005; Consortium for spinal cord medicine 2005

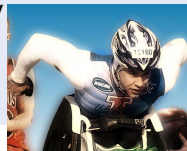
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## Body functions & structures

### Reduce risk of arm overuse

- Decreased wrist ulnar-radial deviation and flexion-extension, shoulder flexion-extension and internal-external rotation
- Shoulder abduction tended to decrease
- The results on push frequency were not unambiguous
- Peak forces decreased



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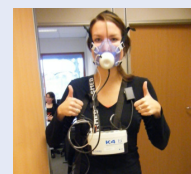


## Body functions & structures

### Remain active vs decrease load

Reduced effort needed for propulsion based on decreased:

- Intensity of muscle activation arm
- Heart rate
- Metabolic costs
- Perceived exertion



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## Activity

### Wheelchair skills

- Beneficial for tasks which require more effort
- Less beneficial for precision task and tasks which requires wheelies or removing / replacing wheels



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## Activity & Participation

### Daily use

- One study out of four reported faster or further traveling
- No significant change in:
  - Number of involved activities, occupational performance
  - Time spend traveling a wheelchair
  - Quality of life

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## Summary

### PROS

- Promising in reducing upper extremity load
- Decrease in cardio-pulmonary demand
- Increase in propulsion efficiency
- Easy access to challenging environments
- Compared to a powered wheelchair
  - Relatively light weight and easy to transport
  - Maintaining benefit of exercise

### CONS

- Additional weight ( $\pm 10$  kg per wheel) and width (2cm) transportation and access to home environment
- Difficulty performing tasks which require greater control such as a wheelie
- ! Long term effect on upper extremity injuries and physical fitness unknown.

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## For more information



A systematic review on the pros and cons using a push rim-activated power-assisted wheelchair

Clinical Rehabilitation  
Published online 5 September

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## Thank you for your attention





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Enschede



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