

Assistive Technology, Seating and Mobility

# Powered mobility

Lori Rosenberg PhD OT

Hebrew University

Ilanot School

Jerusalem

April 2021

## Powered mobility

RESNA: RESNA Position on the Application of Power Mobility Devices  
for Pediatric Users- update 2017 <http://www.resna.org/sites/default/files/legacy/Position>

[http://www.resna.org/sites/default/files/legacy/PositionPapers/RESNA%20Ped%20Power%20Paper%2010\\_25\\_17%20-BOD%20approval%20Nov2\\_2017.pdf](http://www.resna.org/sites/default/files/legacy/PositionPapers/RESNA%20Ped%20Power%20Paper%2010_25_17%20-BOD%20approval%20Nov2_2017.pdf)

Kenyon (2018). Power mobility training methods for children: A systematic review

Durkin (2009) Discovering powered mobility skills with children: “responsive partners” in learning

## Alternative mobility

### Manual wheelchair

- Outdoor mobility is difficult
- Damage / pain to UE – lowers QoL
- But... easier to fold, use indoors....

### Wheelchair with gears

- healthier (more ergonomic)



- Increases participation in more environments
- Hard to fold and maneuver in small spaces

[riomobility.com/en/leverdrive/pivot-benefits.html](http://riomobility.com/en/leverdrive/pivot-benefits.html)

(Flemmer & Flemmer, 2016)



<http://gearwheel.se/en/>

## THE GEAR-SHIFTED WHEELCHAIR WHEELS

Gearwheels wheelchair wheels with two gears and hill hold gives the user more power and makes everyday life easier. The wheels are made to fit manual wheelchairs such as Panthera and Quickie Helium.

Shifting is done by turning the gear lever located on the outside of each wheel. The only thing that needs to be mounted on the wheelchair is a wheelchair-specific bracket. Besides that, the wheelchair will stay untouched.

FOR MORE INFO

<https://www.magicwheels.com/>

# Alternative mobility

- Bicycle attachment with gears
- Electric bicycle attachment
- Motors on the wheels





- Power pack

## Smart Drive

[https://www.youtube.com/watch?v=a-\\_hgHJdnu](https://www.youtube.com/watch?v=a-_hgHJdnu)



4

Powered chair for stairs...



## Why powered mobility?

- It's not a "failure" rather a choice



- Powered mobility allows development and participation
  - To achieve independent mobility
  - To allow development
- Mixed mobility
  - For outdoors and community
  - For playground
- Increases other types of mobility

Kenyon, Mortenson & Miller, 2018

Livingstone & Field, 2020

RESNA position on application of powered wheelchairs for pediatric use, 2018

## Who needs powered mobility?



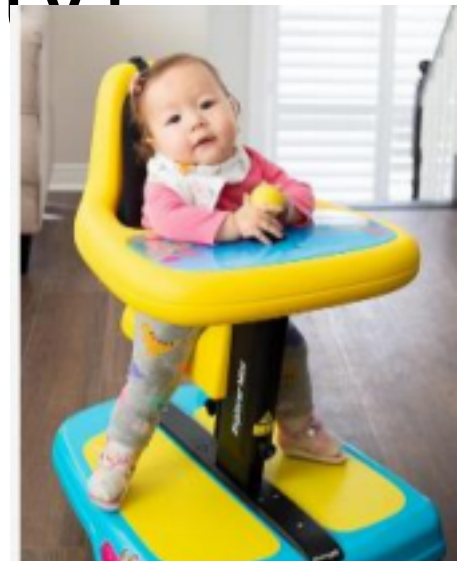
- Study in Sweden wheelchairs (Rodby-Bousquet et al., 2016)
  - 838 children in manual- Only 10% were independent outside!
  - 166 in powered wheelchairs- 75 & were independent outside.



- Canada: 519 children CP ( 4-12 years old)
  - 67% of children are pushed by their peers

## Who needs powered mobility?

- **Babies**
  - **From 7 months** (Lynch, Ryu, Agrawal, & Galloway (2008))
- **Toddlers (18 months)**
  - Allows development



- Psychological
- Cognitive
- Perceptual
- Social
- Executive

<http://permobilus.com/product/explorer-mini/>

Anderson et al. (2013) ; Casey, Paleg & Livingstone, (2013); Livingstone & Field (2015); James, Pfaff & Jeffries (2019).....



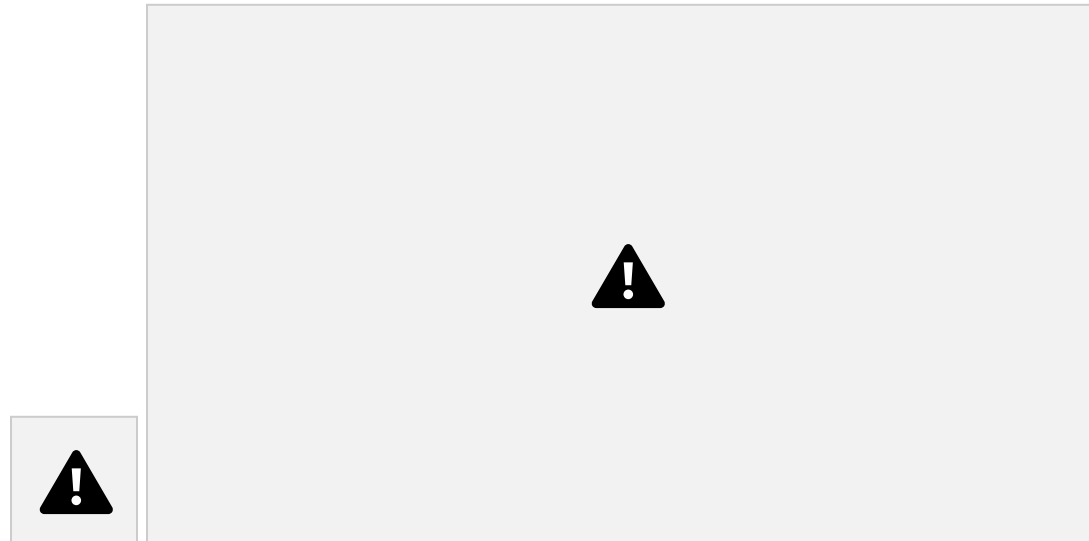
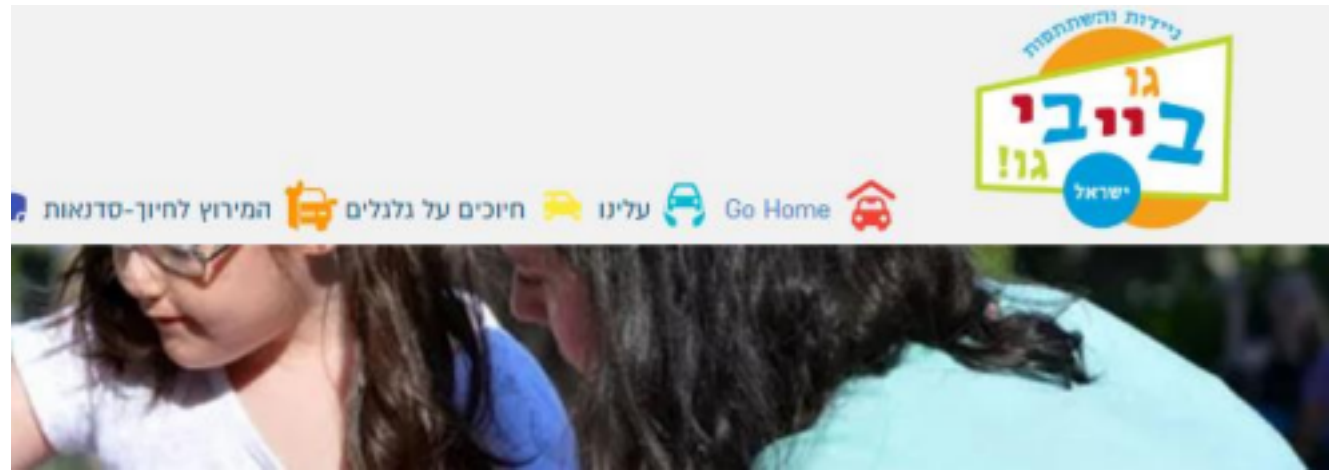


Babies, start your engines!



<http://www.udel.edu/gobabygo/>

<http://nationswell.com/babiesdrivingracecars/>

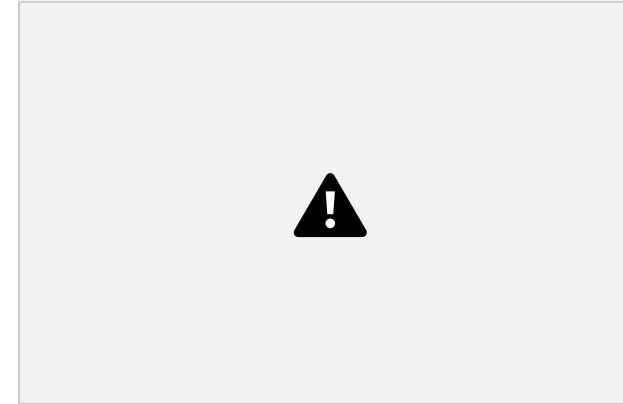


Modified Ride-on Cars as Early Mobility for Children with Mobility Limitations:  
A Scoping Review

[James](#), [Pfaff](#) & [Jeffries](#) (2018)

# Alyn Powered Wheelchair Loan Project

- Alyn hospital with Bituach le'umi
- To allow children to learn powered mobility
- Intensive practice
- Ecological practice
- Requires accessible home
- Before passing MoH proficiency test



## Who is entitled by MoH?

- People with 4 effected limbs (can nit propel manual chair)
- Till 70 years old
- Active life style
- Accessible home and environment

- Proficient in a powered wheelchair
  - Cognitive
  - Coordination
  - Medical (epilepsy)
  - vision
- Transported in van with a lift

## Predictors

Children:

- Manual control ( can propel manual wheelchair)
- Joystick
- Cognitive (stop on command , SB)

Adults- vision



(; Gefen, Rigbi, Archambault & Weiss, 2019 ; Mockler, Mcewen & Jones, 2017; Massengale et al., 2005)

## Other populations

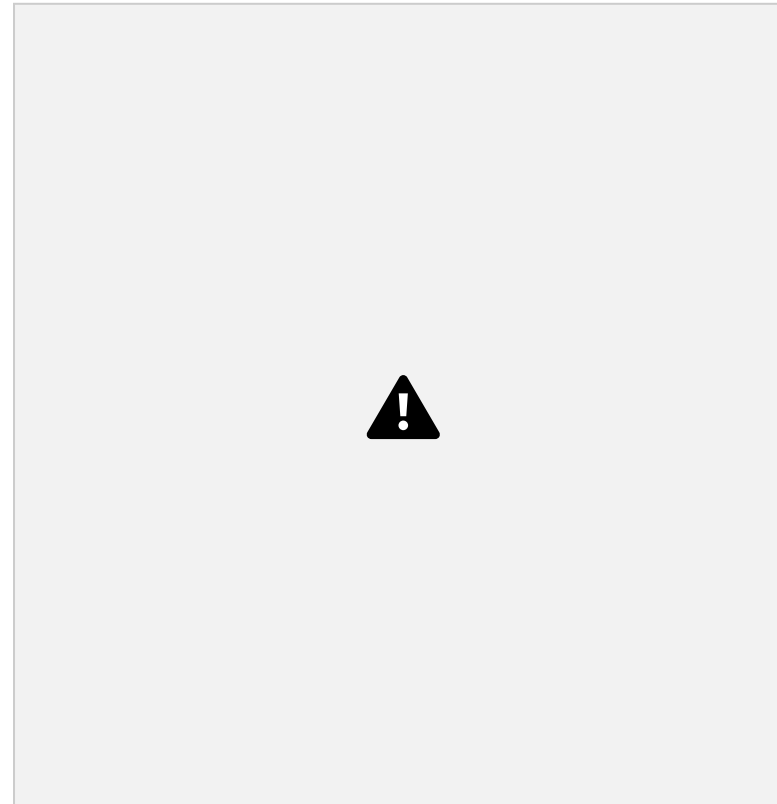
- “Drive to learn” (Nilsson et al., 2019)
- Powered mobility for people with cognitive disability
- Adults after cognitive impairments (Smith et al.  
2020)

# Power Mobility learners

Three groups of power mobility learners (Field & Livingstone 2018):

- Exploratory learners
- Operational learners
- Functional learners
- All young children begin as 'exploratory learners'

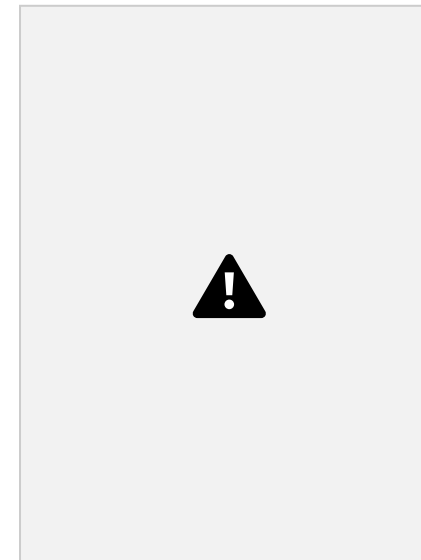
**Exploratory  
Learner**





- Constant assistance, close adult supervision •  
Motivating activities encouraging self-initiated mobility •  
Protected, familiar environment
- Children with cognitive or sensory impairments (visual deficits, CVI, etc.)
  - May remain at this level for protracted periods • May never progress to next group

## Operational Learner

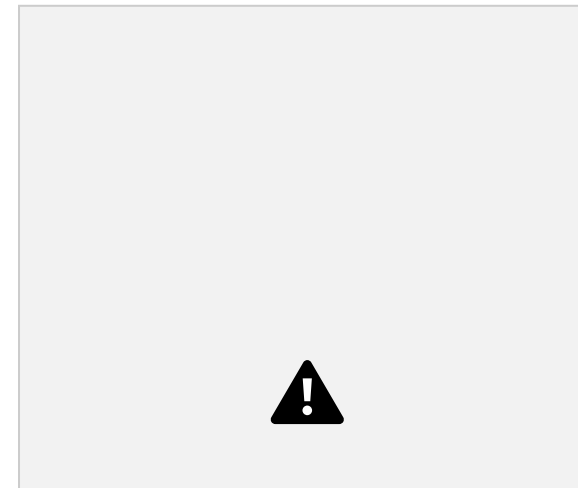
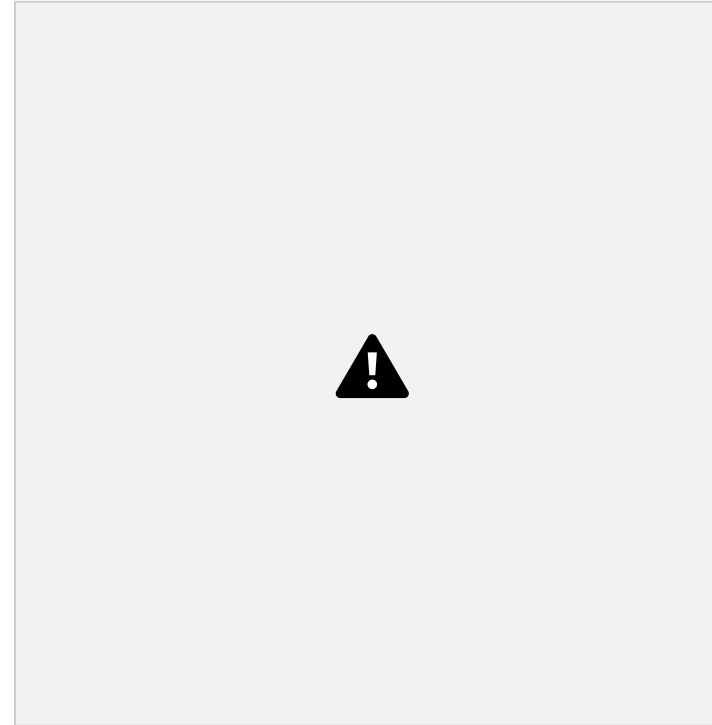


- Close adult supervision, assistance at times •  
May spend extended time learning basic skills

- Independence and safety vary with environment/activity
- Ongoing adapted play (activities)
- 1 or 2 environments

## Functional Learner

- Progress through exploratory and operational stages
- Basic control with supervision (varying distances)
- Need to learn to use PM safely
- Variety of activities and



environments

- Focused on integrating device into daily life activities

## Power Fun

- Therapeutic powered mobility summer camp
- 5 days/week, 3 weeks
- Personalized, adapted powered wheelchairs
- 2 sessions of PM
  - Morning: exploration, outdoors
  - Later: social games, indoors
- In powered chairs most of the day

Summary of research



- 23/24 completed the summer camp
- Significant improvement in powered mobility skills • 8/24 - passes the “driving test”
- Most personal goals were achieved 160
- **Reversal of negative spiral**
  - Initiation
  - Social interaction
  - empowerment
- All the kids had fun

180

140

120

100

80

60

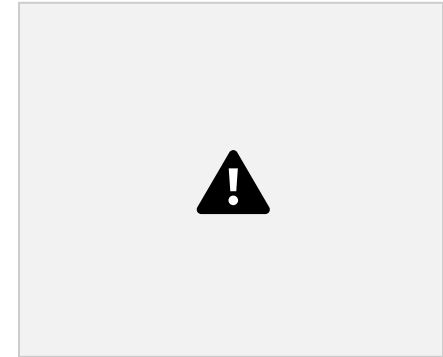
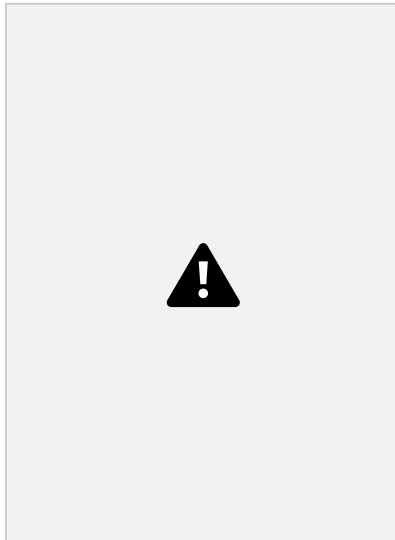
40

20

# Summery

Powered mobility for many populations: • Babies and toddlers with limited mobility • Mixed mobility – outdoors and participation • Main mobility

- For development



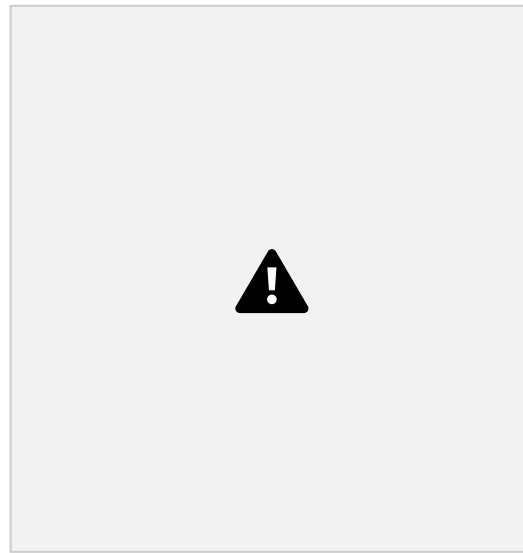
# Reflections....

Please fill in this google form with reflections on children who you work with who might benefit from powered mobility

<https://forms.gle/R4NcLsZPf475pWeg6>

## Thank you

I hope you have learned from this lesson Please  
feel free to contact me if you have questions



Laura.Rosenberg@mail.huji.ac.il