Mobility after SCI: Conceptualized as a Phenotype

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Question...

When faced with a mobility challenge, what does a person choose to do?
Do they choose the most direct route?

Do they choose a longer, indirect route?

Do they choose not to participate?
When faced with a mobility challenge, what does a person choose to do?

Their chosen behavior is ‘ICF performance’
Could mobility ‘performance’ also be considered a phenotype?
What then is the Genotype?
Genotype

- Injury motor & sensory level
- Injury motor & sensory completeness
- Fitness level
  - Muscular strength
  - Cardvascular endurance
  - Anaerobic power
- Gender
- Age
- Duration of injury
- Wheelchair skill
- Wheelchair configuration
- Pain
- Spasticity
- Walking ability
Phenotype

- mobility performance in the community (ICF performance)

- mobility performance on standardized tests (ICF capacity)
Phenotype

• A range of possible performances
  ▫ Day to day variance
  ▫ Vary over time
  ▫ Can shift towards increased or decreased mobility

  ▫ Goal: shift towards maximal mobility....

  ▫ Does a person do all that you think they could do?
    • Paralympian vs. Early post injury
What are we measuring?

- Mostly genotype

- Phenotype
  - ICF capacity.... But is that enough?
Development of a Research Theme

Injury Level

Fitness

Wheelchair Skill

Wheelchair configuration

1. Mobility

2. Independence
Research Questions

1. How is ABILITY to complete a Mobility skill affected by or related to...
   1. Injury Level
   2. Fitness
   3. Wheelchair configuration

2. If a person can complete a skill, how is mobility skill PERFORMANCE affected by or related to...
   1. Injury Level
   2. Fitness
   3. Wheelchair configuration
Initial Research

Testing Protocol

- 4 test days

1. Aerobic Capacity (Endurance)
2. Strength Capacity (Strength)
3. Anaerobic Capacity (Power)

4. 14 wheelchair/mobility skills (adapted wheelchair circuit)

- Each test day separated by at least 48 hours

- All testing completed in 5 weeks
• **14 Skills**
  - Completed as fast as possible
  - Time to complete recorded (Performance)

1. Figure 8 propulsion
2. Small threshold (1.2 cm)
3. Large threshold (4.0 cm)
4. Platform Climb (10.0 cm)
5. 15m Sprint
6. Grass
7. 3% Ramp
8. 6% Ramp
9. Open, enter, close door
10. Side Slope
11. Stationary Wheelie
12. Propulsion in a Wheelie
13. Level Transfer
14. 3 minute wheel
But what is missing?

When faced with a mobility challenge, what does a person choose to do?
Additional Personal Factors

- **Personality**
  - Risk Takers vs. Risk Adverse

- **Skill Self-Efficacy**

- **Cost vs Benefit**

- **Role of personal experiences**
  - Failed attempts
  - Successful experiences
Genotype

- injury motor & sensory level
- injury motor & sensory completeness
- fitness level
  - muscular strength
  - cardiovascular endurance
  - anaerobic power
- Gender
- Age
- duration of injury
- wheelchair skill
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- pain
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- walking ability
Genotype

• Defines the upper boundary

• Defines the motor & sensory resources available to support mobility
From Genotype to Phenotype

- Genotype – what a person ‘should’ be able to do based on ....

- Phenotype - what they actually do ‘ICF Performance’
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- Goal: shift towards maximal mobility....

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Injury Level
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Personal Factors

1. Mobility
2. Independence
Questions

Comments

Thoughts
ICF

Health Condition → Body Structure → Body Function

Body Function ↔ Personal

Activity
Different Approaches

- Clinical
  - Comprehensive, all inclusive picture, individual adjustments

- Research
  - Reductionist approach