

Mobility and Transportation

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Why is Transportation so Critical?

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- Enables access to desired community venues.
- Gives the opportunity to engage in desired occupations.
- Inaccessibility leads to decreased living conditions:
 - Financial difficulties.
 - No access to education, healthcare, recreational activities, etc.
 - Mental health issues, social isolation of themselves and caregiver.
- People have a right to transportation (UN Convention on the Rights of Persons with Disabilities)

Human Component

- Motor impairments
 - Affect ability to sit upright, or have strength and ROM to use a car
- Visual impairments
 - reduction in visual field & peripheral FOV
- Hearing impairments
 - Reduction in awareness to relevant noises, e.g. honking
 - Considered less critical than visual impairments
- Reaction time
- Cognitive Impairment
 - Memory, judgment, executive functioning
 - Multitasking is common problem in driving, exacerbated by cognitive impairments
- Age
 - Age alone is not a predictor of safe driving, but the presence of disabling conditions are a mediator

Original Equipment Manufacturer (OEM)

- Individuals with disabilities may not be able to use the OEM controls
- Range of motion, strength, coordination can prevent use of OEM
 - E.g. spinal cord injury patients may not have full sensation to use brake and accelerator pedals
 - Individuals with musculoskeletal conditions may have limited ROM to exert enough force

3 Activities Related to Transportation

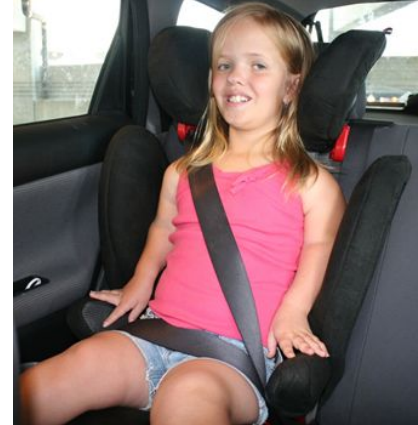
- Occupant protection
 - That which secures and safely positions the person in the vehicle.
 - Seatbelt, headrests, etc.
- Vehicle ingress and egress
 - Differs depending on whether or not an occupant remains in a wheelchair
 - Automated ramps, lifts, etc.
 - Also preventing unintentional egress.
- Driving
 - Primary activities (steering, acceleration)
 - Secondary activities (using lights, setting emergency brake, etc.)
 - Both types of activities must be taken into account for design and assessment purposes

Occupant Protection - Children

- Children less than 40 lbs. must use a child restraint safety system
- Rear facing infant seats must be used from birth to 12 months or 22 lbs.
- Forward facing restraint systems must be used to accommodate children up to 40 lbs. and 40 inches in height.
- After 40 lbs., they can move to a booster seat
- Children are ready for seat belts at 80 lbs. and at least 4'9".

Examples of Occupant Protection - Children

- Backward facing
- Forward facing



- NHSTA'S Register Your Car Seat program
 - Ensures parent's car seats are safe.
 - <https://www.safercar.gov/parents/CarSeats/Car-Seat->

Specialized Examples of Car Seats

- Car beds
- Adaptive belt positioning booster
 - Provides additional support
- Vests
 - Can be used as AT for children up to 168 lbs.



Vehicle Ingress and Egress

- Having the height of the seat match hip height
- Wide door opening
- A handle to steady themselves
- Transfer boards (video)
- Seat swivel



Slide HandyBar into striker



Use HandyBar for support while standing



Vehicle Ingress and Egress (cont.)

- Van modifications usually have ramp for access and tie-down system for wheelchair.
 - Either side or rear access.
 - Must keep wheelchair dimensions and turning radius in mind.
- Must have space for restraint system and for the caregiver/adult to maneuver to secure occupant.



Driving

- Primary driving controls
 - Stop (brakes), go (accelerator), steer
- -Pedal hand controls (video)
- Pedal extensions
- Reduced diameter wheel
- Modified steering



Assessment

- A driving is evaluation can be used for individuals who have had their licence removed due to an illness.
- Driving evaluation has two components: off road assessment and on road component.
- It should include cognitive, physical, visual and perceptual elements. Medical and driving histories are recommended.
- Canadian group led by Korner-Bitensky et al., 2005 recommended the following:
 - Stopping at a light/stop sign, right & left turns, merging & accelerating into traffic, reverse, variety of speed limits

Evaluation Outcome

- The driving evaluation can be one of the following outcomes:
 - a. The user has the skills to continue driving safely
 - b. The individual does not have the skills to continue driving safely
 - c. The individual has basic skills, and can continue with a driver training program
 - d. The individual has specific impairment that limits driving ability, and they must be trained and assessed with adapted driving controls.

Thank you!