Older adults' comfort experience, seat belt fit and misuse when travelling in cars

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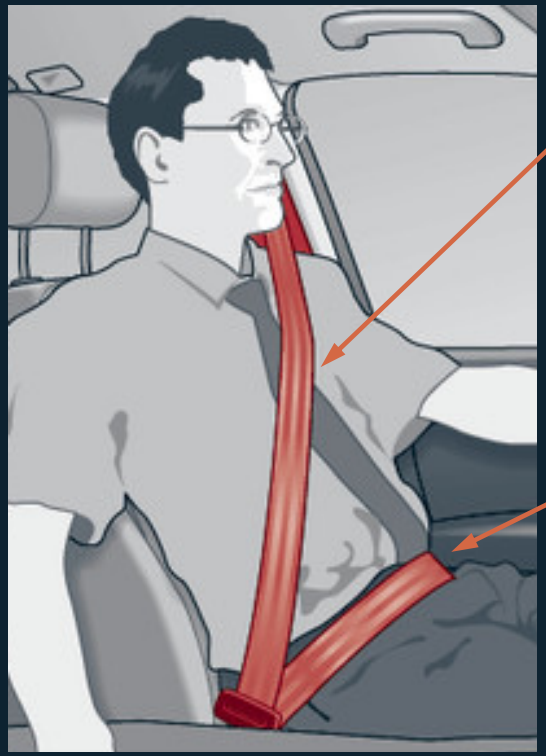
Purpose

Increase knowledge on older adults' seat belt fit, perceived comfort, and safety awareness

Background

- Elderly are frequent car users and accustomed to decide when, where, and how to travel
- An increasing number of elderly will be travelling by car in the future
- Mobility, comfort and safety are important issues for the elderly generation

Seat belt fit



Shoulder belt fit

Belt passed over the mid portion of the shoulder and in contact with the clavicle

Lap belt fit

Belt positioned below the ASIS and in contact with the upper thigh

Seat belt fit

sitting postures

body shape

BMI

Factors associated with seat belt fit

sex

fat distribution

Older adults
Physical characteristics

skeletal and muscular strength

range of motion

joint flexibility

Physical characteristic changes in

body size

increased BMI

redistribution of fat

more upper body fat and less muscle mass

decreased standing and sitting height

Older adults
Physical characteristics

Altered posture

- More forward-leaning and slumped posture
- Flatter and more kyphotic spinal curves
- Thoracic kyphosis – forward head posture

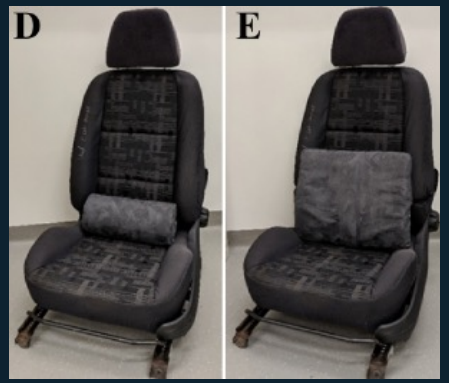
Older adults
Comfort and safety

Comfort perception

- more distress due to pressure, chafing, and movement
- use accessories to reduce discomfort

Perceived safety

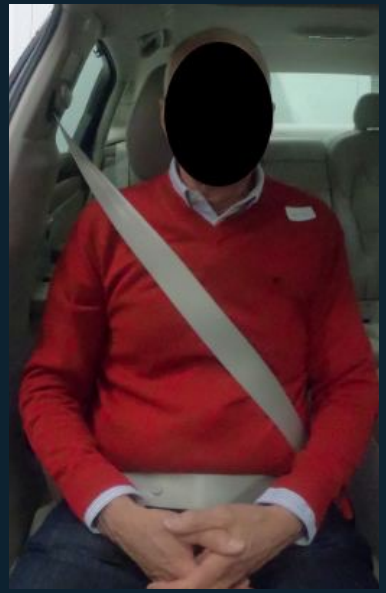
- lack of understanding of how protective system works
- reduced awareness of safety related to non-optimal belt fit



Empirical studies

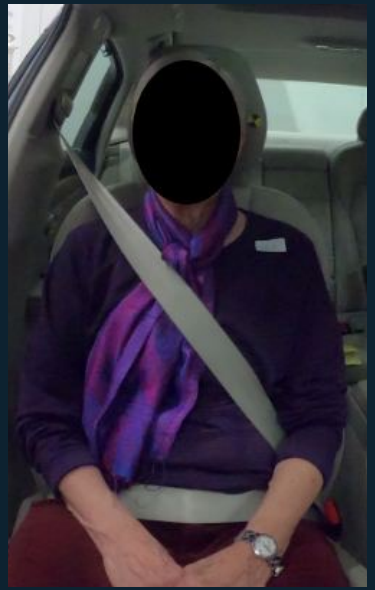
- Older adults (65-80 y/o)
- Stationary and driving studies
- Collected data:
  - Objective data: anthropometric measures, photographs and video recordings
  - Subjective data: Questionnaires and interviews

Observations
Shoulder belt



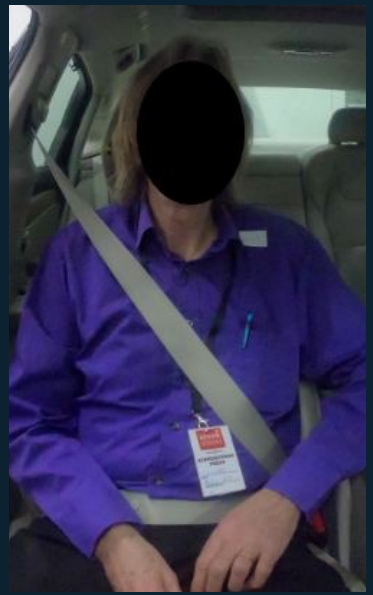
Shoulder belt positioned across the tip of the shoulder

Shoulder belt in contact with neck

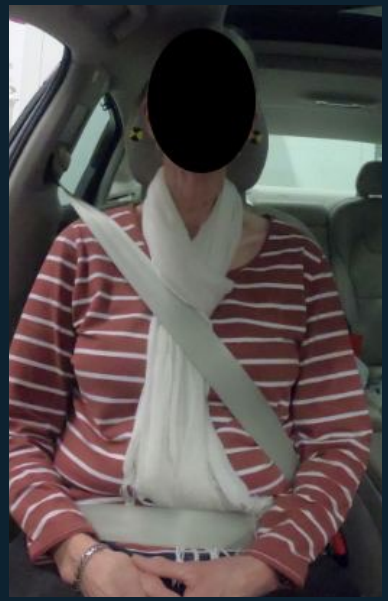


Shoulder belt positioned over the mid portion of the shoulder

Observations
Shoulder belt



Shoulder belt positioned low down on abdomen



Shoulder belt positioned in the middle of the abdomen

Shoulder belt positioned high up on abdomen

Observations
Shoulder belt

Higher up on abdomen with increased BMI ad waist circumference

BMI

Observations
Shoulder belt

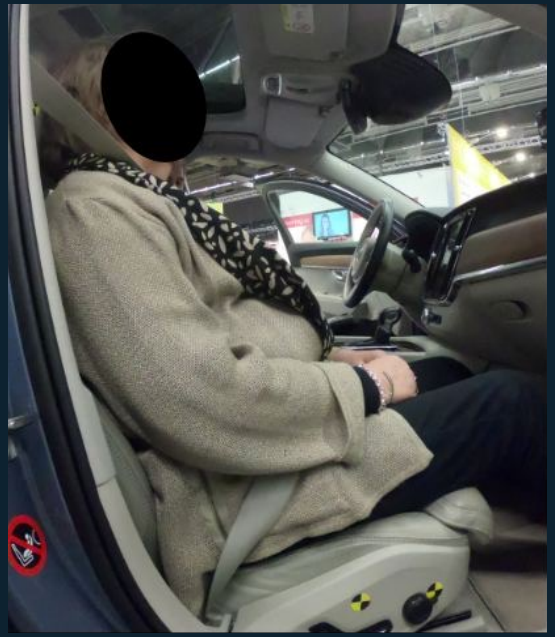
Body shape guides belt towards neck and armpit

→ Shoulder belt discomfort

→ Passenger adjusts shoulder belt

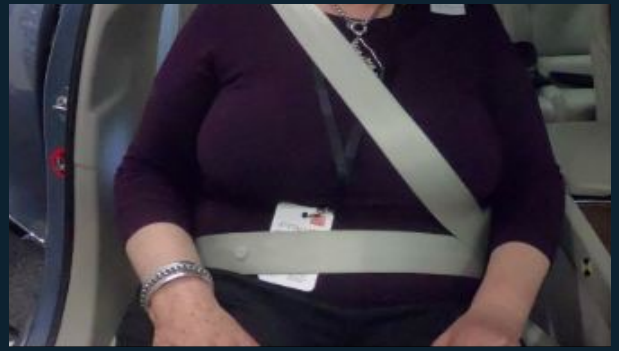
Observations
Shoulder belt

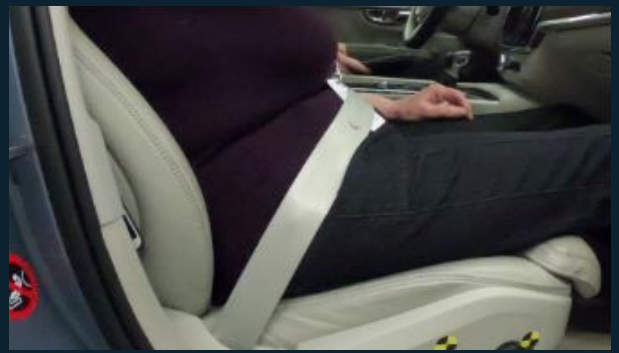
Shoulder not in contact with clavicle



Shoulder in contact with clavicle

Observations
Lap belt

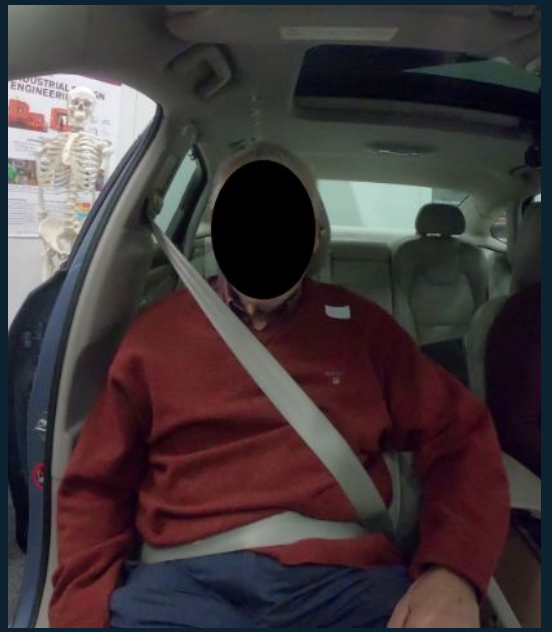




Men - Guide the lap belt below the belly

Women – lap belt higher up

Observations
Twisted belt



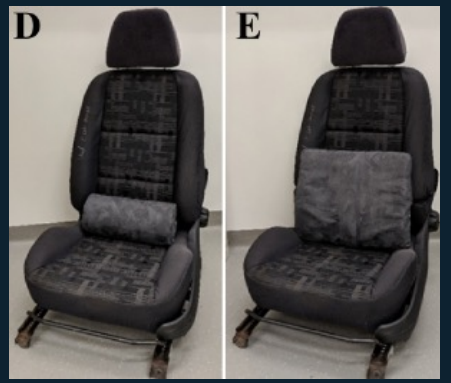
Accessories

Accessories to decrease discomfort and to improve visibility

‘I use a cushion to see better'

‘As long as I wear the seat belt, it’s all good’

‘It is uncomfortable to have the belt tight’



Summary of results

- Non-optimal shoulder belt fit was associated with higher BMI and larger waist circumference
- Females tended to wear lap belt too closer on abdomen
- Males tended to route the lap belt below belly

Summary of results

- Frequent seat belt discomfort → adjustment of seat belt position
- Limited safety awareness
- Accessories to decrease discomfort and to improve visibility out of the windows

Conclusions

Optimal seat belt fit for older adults is challenging due to

- Body composition
- Safety perception
- Comfort perception

By increasing the knowledge of older adults' seat belt usage, guidelines for adjustments can be developed to further improve safety systems in future cars.

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