ENSURING SAFETY OF CHILDREN IN SELF-DRIVING VEHICLES

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WHAT WOULD YOU DO?

• Your 12 year old needs a ride from school to play practice.
  • Do you let her ride in a self-driving Uber?
STUDY 1 OBJECTIVES

1. Understand parents’ views of safety impact of
   – Passenger age
   – Seatbelts, controls, and other vehicle features
   – Trip characteristics: distance, road types, traffic

2. Contribute to policies and standards for safe use
METHODS

3 parent focus groups (N=19)
  – Driving simulator in two modes
  – Private interviews
  – Moderated group discussion

Interviews of 8-16 year old children (N=14)
  – Simulator in self-driving mode
  – Discuss when, how they’d use HAVs

Transcript analyses:
  – Safety features
  – Usage recommendations

Parents 30-53; m=44
Children 8-16; m=11
PARENT INTERVIEWS

• 80% felt comfortable & safe entire time
  • But 55% reported urge to take control!
  • They would expect to take control using brake, accelerator, or steering wheel “similar to disengaging cruise control”

• Level of comfort using self-driving vehicles
  • 60% comfortable alone or with a child
  • 25% comfortable allowing a child to use alone
CHILDREN EXPECT TO TAKE CONTROL BY...

- Using brake pedal (33%)
- Using a button "like on school buses" (33%)
- Talking to the vehicle (21%)
Many parents say “depends on the child”

- Functional ability / maturity / ability to make decisions more important than age
PASSENGER KNOWLEDGE & SKILLS

• Most frequently cited:
  • Ability to make good decisions
  • Able to pass driving test/obtain driver’s license

• Also mentioned:
  • Knowing how to take over control
  • Knowing how to use radio, locks, heat/AC
  • Ability to use cell to dial 911
CHILD USE CASES FROM PARENTS

• Between home and social activities:
  • Friends’ houses, mall, movie theater
• From school to offsite activities
• Between home and sports activities
• Between home and school
  • Between home, school, and after school job
• During emergencies
DESIRED SAFETY FEATURES

• Seat-belt:
  • Verification/checking for use
  • Fastening assistance

• ‘Intruder alert’ notification

• Safety-lock preventing manual mode

• Secure passenger ID system

• Emergency stop switch
OTHER FEATURES

• Parental controls/monitoring
  • Call or establish video link with passengers
  • Only parent can set or modify destination
  • Automatic notification when child arrives
  • Access trip info (speed, location) remotely

• Ability for vehicle to send alerts to previously identified ‘emergency contacts’
INFLUENTIAL FACTORS

• Weather conditions / time of day
• Total travel distance
• Child age/experience/decision-making skill
• Stops between pick up and drop off?
• Evidence on self-driving vehicle safety
  • For a particular make/model of vehicle
    • Recalls/maintenance issues
    • Recent accidents
SELECTED ADDITIONAL RESULTS

- Vehicle ownership matters to many parents
  - More comfortable if parent owns the vehicle
- Passenger training should be available
  - Some say should be required, not all agree
- Supportive infrastructure needed!
BENEFITS & CONCERNS

• Convenience
• Flexibility
• Emergency solution

• Passengers vulnerable to harm if
  • Technology fails
  • Mechanical issue
  • Hit by human driver

• Cyber-hijacking

CAUSE FOR CONCERN
STUDY 2 OBJECTIVES

1. Understand how different seating configurations impact use of child restraints

2. Help address NHTSA’s recommendations for HAV safety, by ensuring novel seating configurations will allow children to ride safely
METHOD: USABILITY TEST

• Parents bring restraints and children
• For each of three simulated interiors
  • Parents install seats, secure children, fasten selves in
  • Parent and child interact for ~5 minutes:
  • Parent removes seat-belt, moves to another seat, fastens belt, and interacts with child for ~5 minutes
  • Parent removes seat-belt, releases child & removes restraint system
• Parents and older children (5-7) interviewed
PARENT SURVEY

How would you rate your experience:
• installing your child(ren)’s car seat(s)?
• securing your child(ren)?
• interacting with your child(ren) while you were both secured in the vehicle interior model?
• removing your child(ren)’s car seat(s) in the vehicle interior model?

What did you like best/least?
INTERVIEW QUESTIONS

• For parents:
  • What *safety features for children* do AVs need?
  • When & where do you expect children to ride in AVs?
  • What sorts of *scenarios* would you want *tested*?
  • Which interior did you like best? Least? Why?

• For 5-7 year olds:
  • How *comfortable* were you?
  • Did it feel like you would be *safe* in that position?
  • Which did you like best? Least? Why?
Responsibility = Opportunity

• HAVs coming fast... already in several cities
• Few people thinking about child passengers
  – Responsibility to consider children up front
  – Opportunity to pioneer a challenging topic
  – Parent and child inputs needed to inform
    • new policies
    • HAV safety feature design and development
    • best practices/recommendations
    • Societal / infrastructure requirements
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OPEN QUESTIONS...

• How can we transition safely?
  • Current use cases are untenable (unrealistic = unsafe)
  • What sort of scaffolding do drivers need?
  • What sort of scaffolding do non-drivers need?
  • What sort of training/abilities do passengers need?
  • What sort of capabilities do vehicles need?
  • What sort of infrastructural / societal feature needed?

• Don’t forget child passengers’ needs
RELEVANT RECENT LITERATURE

EARLIER LITERATURE


