Background

- TREAD Act mandated NHTSA to:
  - Determine whether to include CRS in every NCAP vehicle (Section 14(b)(9))
    - Vehicle Evaluation
  - Develop CRS rating system (Section 14(g))
    - Ease of Use
Goals for 2003 Pilot Study

1) Establish whether a 3YO Hybrid III in a 5-point harness performs similar to:
   - 1YO CRABI Rear-facing (RF)
   - 6YO Hybrid III Belt Positioning Booster
   - 3YO Hybrid III Overhead Shield

2) Determine what parameters influence with CRS performance
Experimental Design

- Include cars, pickups, and SUVs
- Paired CRS Tests
- LATCH
- Minimum sample size of 8
- Fully instrumented child dummies
  - Head, chest, and pelvis triaxial accelerometers
  - Chest displacement potentiometer (Hybrid III)
  - Upper and lower neck transducers
Experimental Design/CRS Configurations

- P3 position had forward-facing 5-point harness which was used as baseline for comparing P4.
- P4 position had:
  - 9 tests rear-facing with CRABI
  - 8 tests booster with 6YO
  - 10 tests overhead shield with 3YO
CRS Types Used

Front view

Side view

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<tr>
<th></th>
<th>5-Point</th>
<th>Overhead Shield</th>
<th>Booster</th>
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<tbody>
<tr>
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<td>6YO</td>
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SAE Government and Industry
1.) Forward Facing Convertible with 3YO vs. Rear Facing Convertible with 1YO
Photo for test setup
# Paired T-test Results

## Comparison with 3YO in 5-Point Harness

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2.) Forward Facing Convertible with 3YO vs. Highback Booster with 6YO
Photo for Test Setup
Paired T-test Results

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HYPOTHESIS: There is NO difference (95% Confidence)
3.) 5pt FF with 3YO vs. Overhead Shield FF with 3YO
Pre-test Photo for 5pt and OH

5-Point Harness

Overhead Shield + 3-Point Harness

SAE Government and Industry
Paired T-test Results

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4.) Parameters affecting child readings
Vehicle Structure

- Pulse Duration shows mild correlation with chest G
- Similar trends for peak acceleration and static crush

![Graph showing correlation between Pulse Duration and 3ms Chest G](image-url)
Vehicle Interior Parameters

- Tether location (Vans and SUVs)
- Seat contour
- Seat clearance (RF)
- Seatbelt retractor performance (Booster)
Preliminary Observations

- 3YO in a 5-point CRS HIC readings had no significant difference from 1YO, 6YO, or overhead shield
- 3YO in a 5-point CRS chest G readings had a significant difference from 1YO and 6YO
- No significant difference for chest G between 5-point harness and overhead shield
- Vehicle interior and structure have an effect on child dummy readings
Additional Observations

- Following factors did not correlate with 3YO dummy readings:
  - Driver and front passenger readings
  - Vehicle type
Additional Information

- Docket #4962
Thank You