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User-centric solutions to increase use of booster seat and appropriate use of vehicle seat belts among children

The George Institute
for Global Health

Professor Julie Brown, Head, Injury Program

UNSW SYDNEY NeuRA Discover. Conquer. Cure.

User-centric solutions to increase use of booster seat and appropriate use of vehicle seat belts among children

The George Institute for Global Health

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The problem: Inappropriate transition to adult belts

Seat belt fit & positioning important for good crash protection

GOOD SEAT BELT FIT

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The problem: Inappropriate transition to adult belts

Poor seat belt fit decreases restraint effectiveness & increases risk of misuse

POOR SEAT BELT FIT

MISPOSITIONED SEAT BELT

The problem: Inappropriate transition to adult belts

Different jurisdictions regulate/advise on the transition differently using different thresholds and metrics

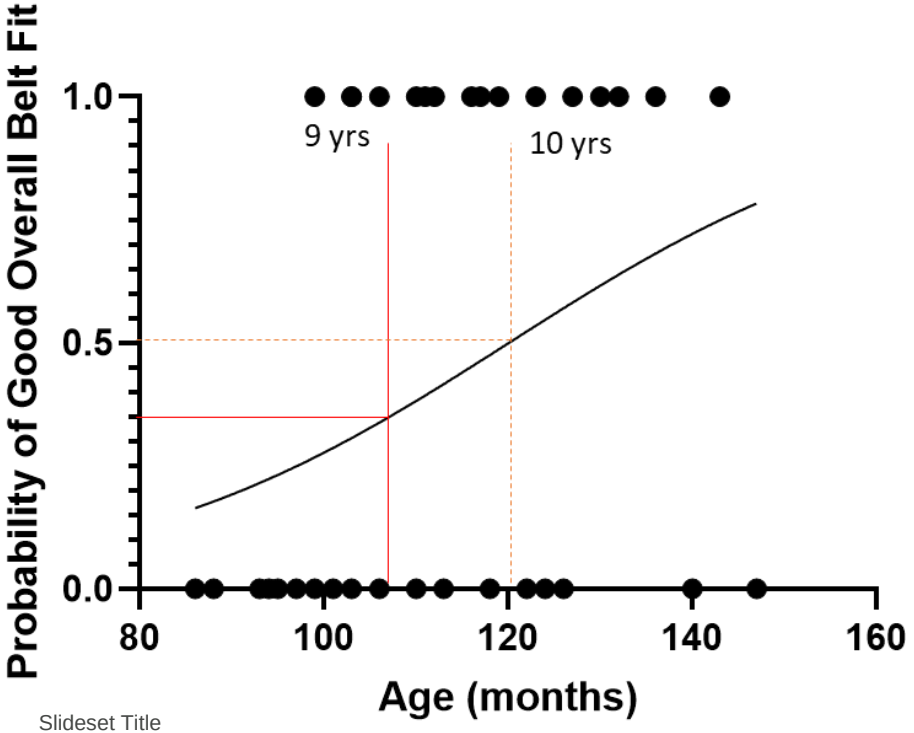
e.g.

- In US different states require a child to be 6–9 years of age, 145 cm tall or 29–36 kg.
- Some European countries require children > 12 years and/or taller than 150 cm.
- In Canada, laws vary depending on province with the highest limits mandating booster seat use until at least 9 years and/or taller than 145cm.
- In Australia and New Zealand, children must be at least 7 years to legally use an adult seatbelts.

The problem: Inappropriate transition to adult belts

No single metric can guarantee a child will achieve good seat belt fit in all cars

Parab A, Whyte T, Albanese B, Bilston L, Koppel S, Charlton JL, Olivier J, Keay L, Brown J. **Can age or height define appropriate thresholds for transition to adult seat belts? An analysis of observed seat belt fit in children aged 7–12 years**. International journal of environmental research and public health. 2022 Jan 28;19(3):1524.



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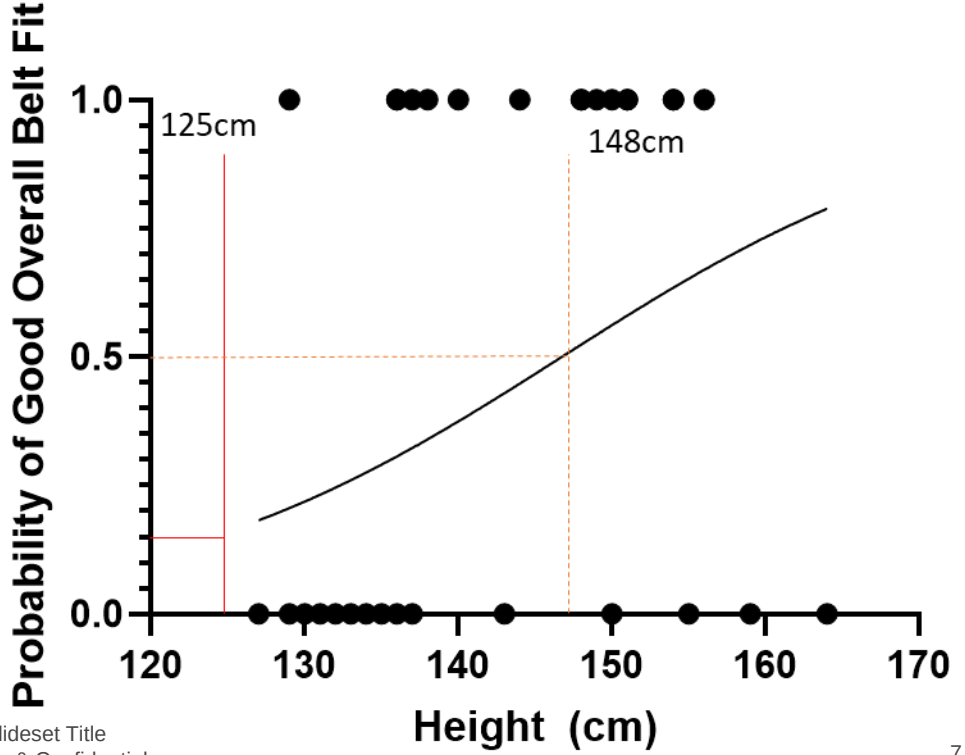

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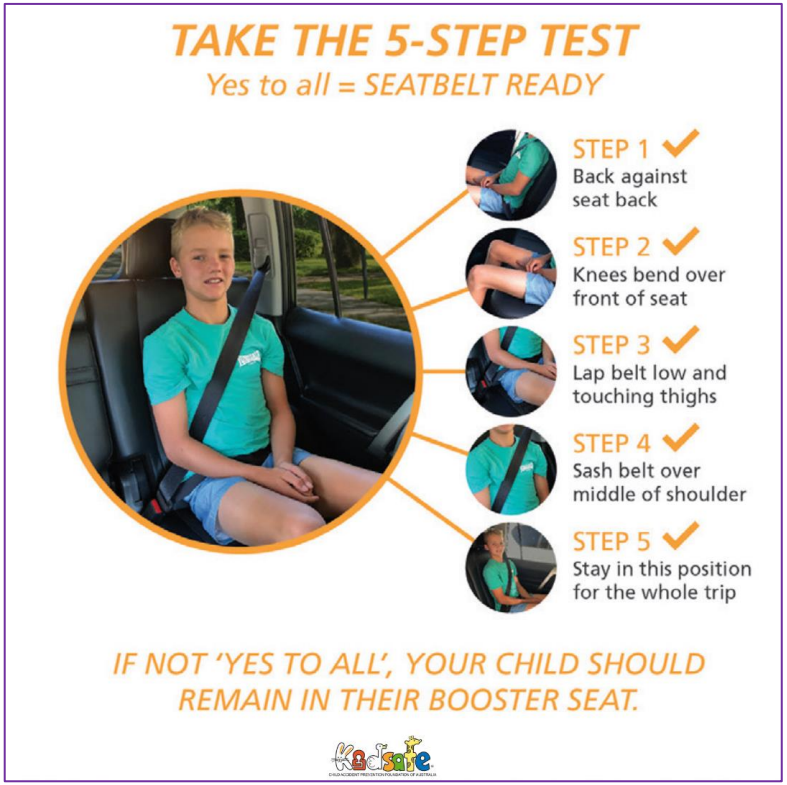
Current solution



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- 40% had poor sash (shoulder) belt fit
- 40% had poor lap belt fit
- 60% had either poor lap belt fit, poor shoulder belt fit, or both.

Research question & objectives

Is this current resource enough or can we do more to help parents make appropriate transition decisions?

Specific questions

1. Is the current resource being used?
2. Is the current resource effective?
3. Can we use our user-driven, theory driven approach to develop a more effective resource?

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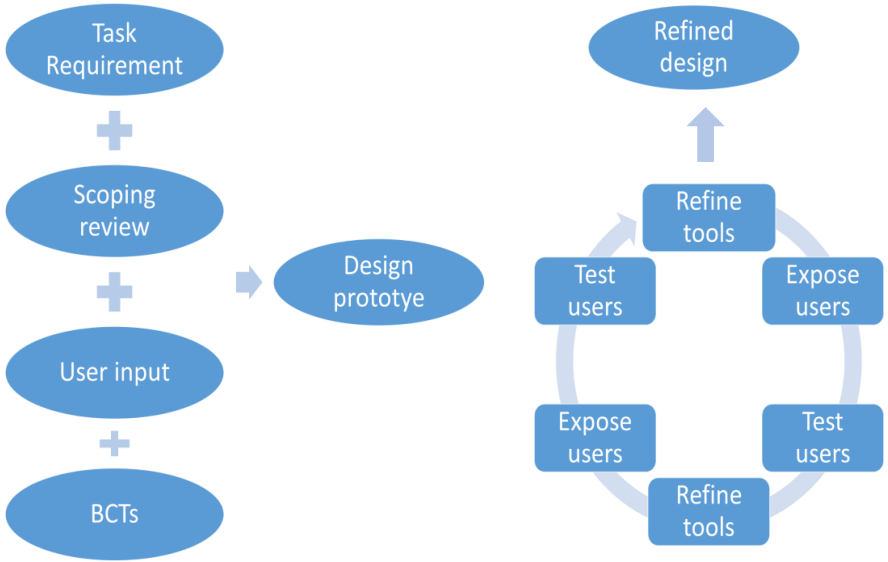
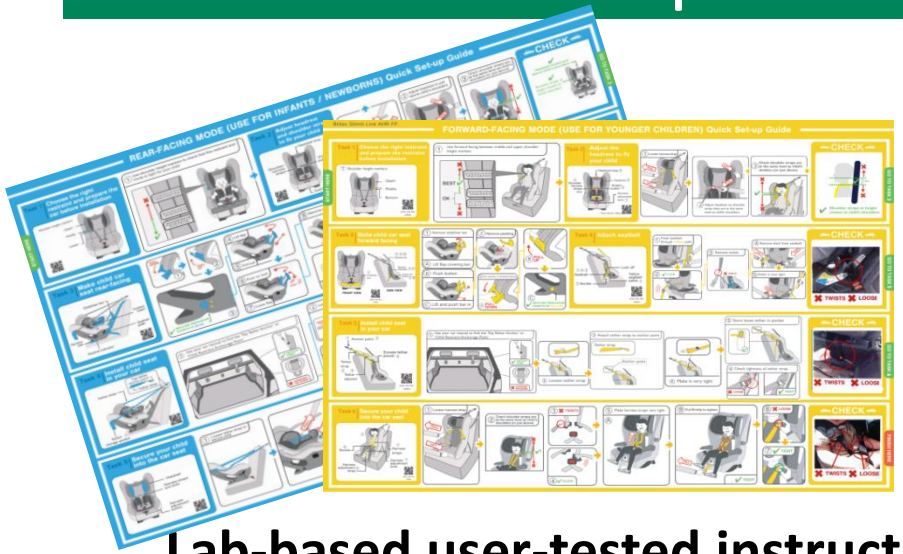
User centric approach

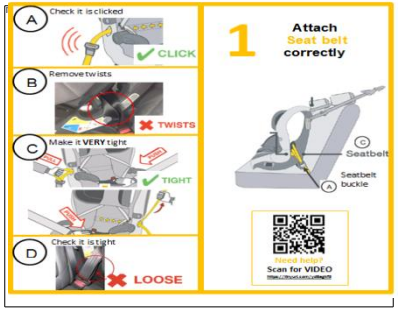


New user-developed instructions



http://q-r.to/baoUit

Lab-based user-tested instructions, QR coded video and swing tags



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1. Is the current resource being used?
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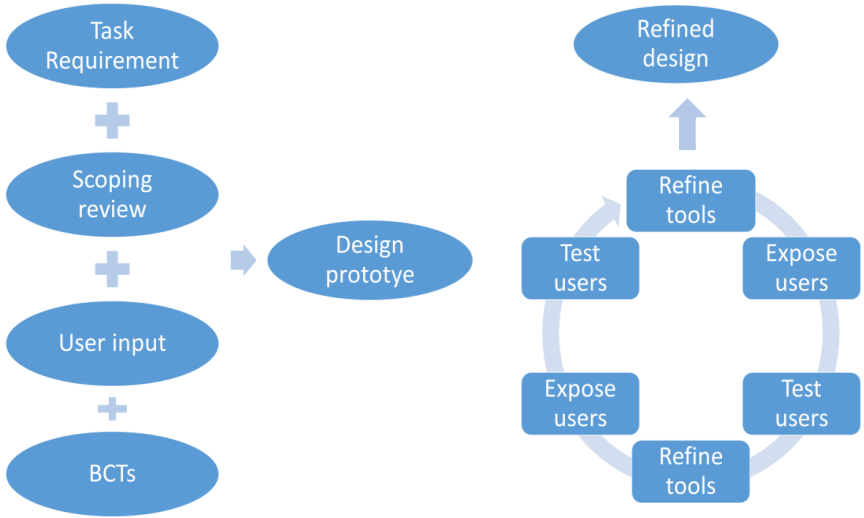
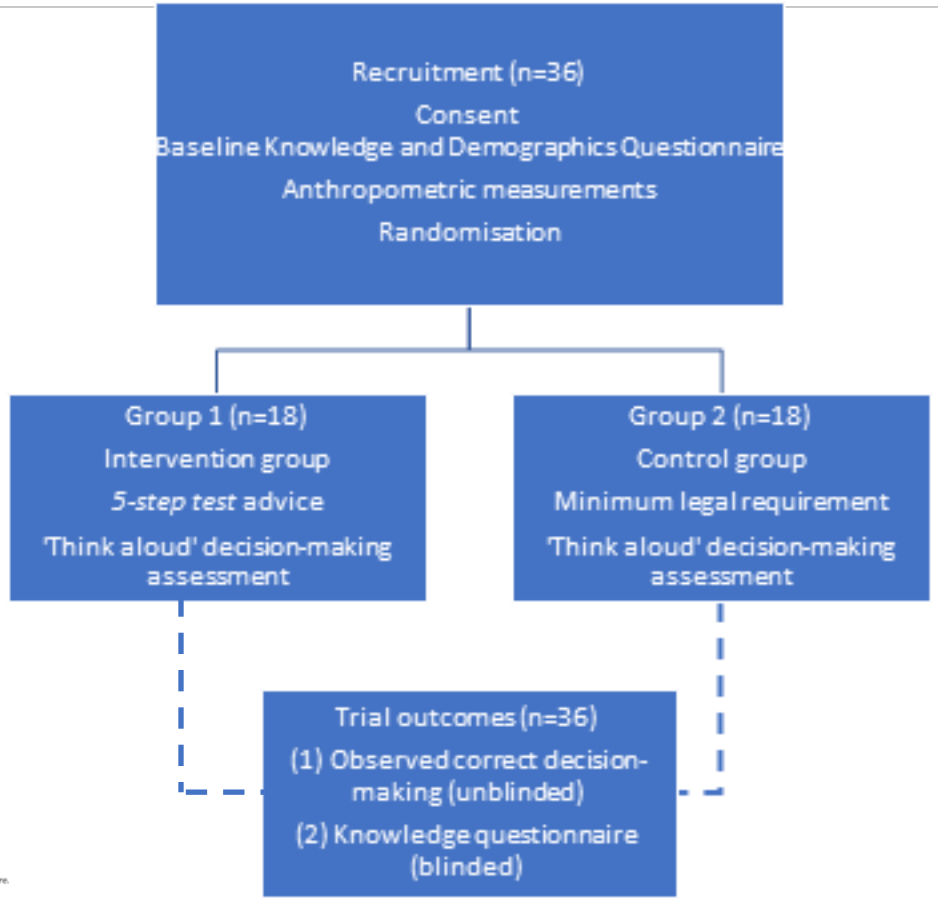
Program of work

1. Evaluate existing materials → 2. Develop & refine new resource → 3. Evaluate new resource



1. Evaluation of existing materials



Is the current resource being used?

- Only 3/36 (<10%) had heard of the 5-step test
- Almost 2/3 had sought information about the transition to adult belts
  - 31% searched online
  - 17% contacted the regulatory authority
  - 11% had asked friends and family

Is the current resource effective?

Decision-making activity: Three ‘Fits’

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Poor fit	Partially good fit	Good fit
		

Is the current resource effective?

Primary outcome

- accurate assessment defined as parent choosing only the correct seating position (i.e., the ‘good’ condition ‘yes’ or otherwise ‘no’).

Secondary outcomes

- correctness of assessment for each seating condition (scored as a binary outcome, yes/no),
- knowledge decision metrics communicated in the 5-step test

Is the current resource effective?

Primary outcome

- 44.4% of the intervention group made accurate assessments compared to 27.8% of the control group, (p=0.298, OR 2.08, 95%CI 0.52-8.34).

Secondary outcomes

- No significant difference between groups for each seating condition
- Intervention group had significantly higher mean knowledge score than the control group (p= 0.012).

Developing a user-driven, theory driven resource

Study 1: Evaluation of existing material

Study 2: Focus groups

Task Requirement

+

Scoping review

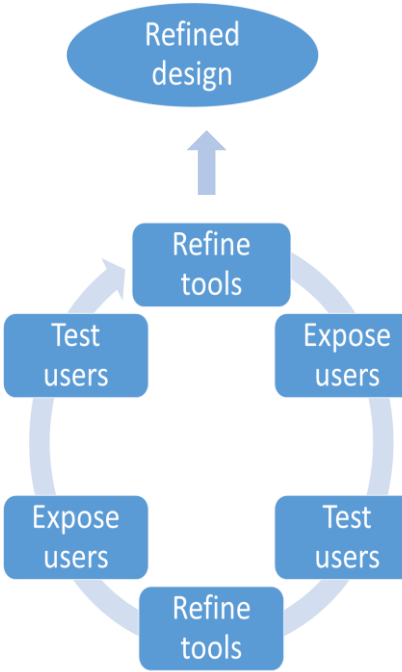
+

User input

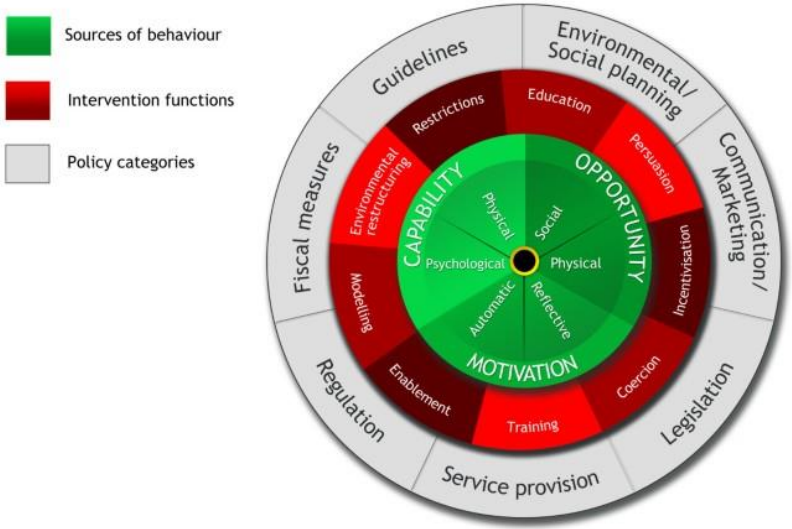
+

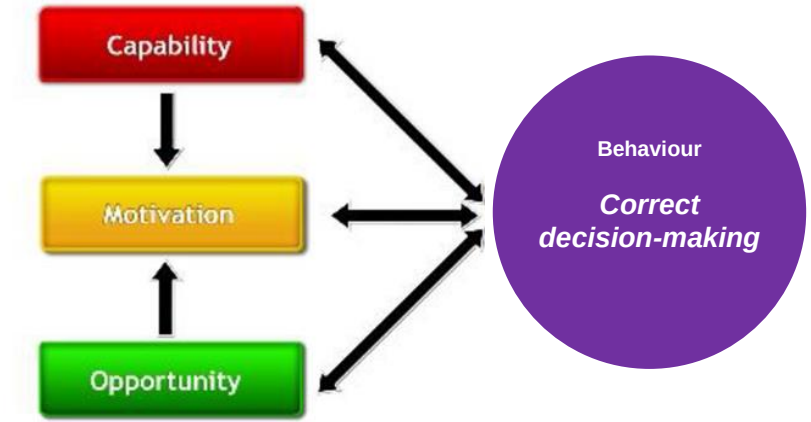
BCTs

→ Design prototye



Behaviour Change Wheel





Michie et al., 2014

Study 1
Critical activities associated with correct decision-making

Area 1 - Buckle engaged

1. Child sits
2. Seat belt engaged - by child or parent
3. Parent physically checks that seat belt is buckled
4. Parent visually checks that seat belt is buckled
5. Parent verbally confirms the belt is properly buckled

Area 2 - Lower back

1. Parent physically checks child's back
2. Parent visually checks child's back
3. Parent verbally confirms whether lower back of child is against the seat

Area 3 - Sash belt

1. Parent physically checks that position of sash belt
2. Parent visually checks position of the sash belt
3. Parent verbally confirms whether sash belt is placed over the shoulder and not touching the child's neck

Area 4 - Knees

1. Parent physically checks child's knees placement
2. Parent visually checks child's knees placement
3. Parent verbally confirms whether child's knees are bent over the edge of the seat

Area 5 - Lap belt

1. Parent physically checks the lap belt and/or the child's waist
2. Parent visually checks the lap belt and/or the child's waist
3. Parent verbally confirms that lap belt is placed low across the waist

Study 1
Understanding failures - critical activities missed

Area 2 - Lower back

1. Parent physically checks child's back
2. Parent visually checks child's back
3. Parent verbally confirms whether lower back of child is against the seat

Area 4 - Knees

1. Parent physically checks child's knees placement
2. Parent visually checks child's knees placement
3. Parent verbally confirms whether child's knees are bent over the edge of the seat

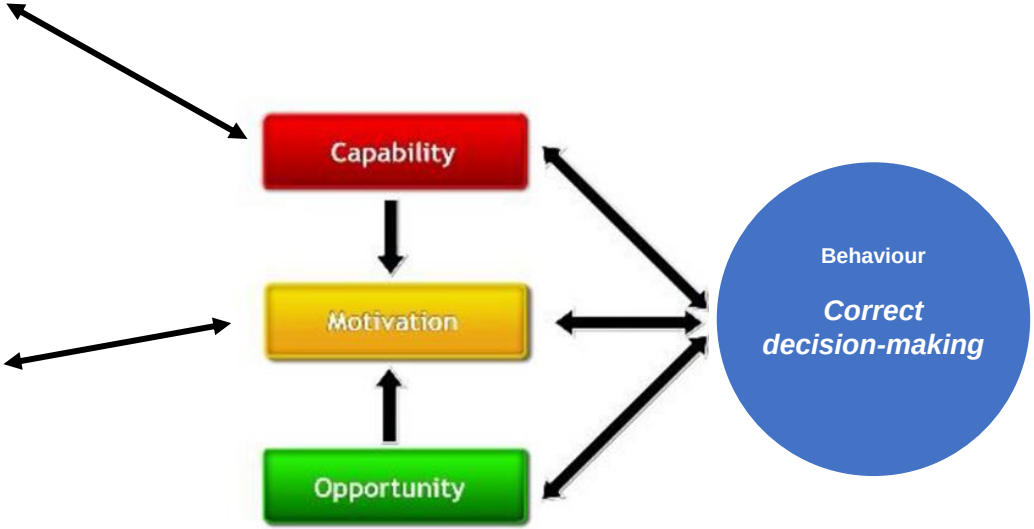
(Image adapted from NeuRA & Kidsafe, 2013)

Study 1
Results of COM-B mapping

- **Mental process and skills** to assess the proper fit, have sufficient attention to systematically check the fit
- **Self-regulation** to establish behavioural routine
- **Physical ability through practice** to perform the tasks required for the behaviour

- **Choice, decision, beliefs, self-efficacy, conscious evaluation** of believing that following the target behavior is important for the child's safety

- **Time, resources, prompts, cues** that create opportunity afforded by the environment, such as and having time to check for appropriate fit of access to the car and the child



(Image adapted from Michie S et al, 2014)

Study 2- Focus Groups

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Total Sample			
Focus Group	Characteristics	Sample size	Location
1	High Socio-economic status (SES) Mothers	5	Zoom – Inner west Sydney
2	Culturally and Linguistically Diverse (CALD) Mothers	3	Face to face - Inner west Sydney
3	Culturally and Linguistically Diverse (CALD) Fathers	3	Zoom - Inner west Sydney
4	High Socio-economic status (SES) Fathers	3	Zoom - Inner west Sydney

Discussion guide

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Questions asked	Links to Capability	Links to Opportunity	Links to Motivation
When did you know it was time to move your child out of the booster seat?	✓		
What does a good fit look like when your child uses the adult seatbelt?	✓		✓
What have your friend and family said about moving children out of booster seats? What do you see at school drop off and pick up, with kids aged 7-12 years?		✓	✓
Specifically, when you are looking at moving your child from a booster seat to using an adult seat belt, what things do you think would help you make this transition?	✓	✓	✓
If you've already moved your child out of booster seat and now understand a good fit differently than before, how likely are you to go back to using a booster for your child?			✓

Study 2: Mapping –Capability

	Psychological Capability: Mental process/skill	Psychological Capability: Interpersonal	Physical Capability: Ability
Classification of group codes/themes	**Competence/skill** - Understanding of safe fit and able to carry out the steps	**Negotiate** – With child	**Ability** – follows safe fit sequence
	Knowledge –Awareness of safe seat belt fit		
	Memory - Remembering to check for safe fit		
	Attention – Maintaining attention to check for safe ft		

Colour	Strength
Pink	Strong
Gold	Moderate
White	Weak

Elo and Kyngas, 2007

Study 2: Mapping –Motivation

	Reflective Motivation	Automatic Motivation: drive, impulses, urges, habits, emotions	Automatic Motivation: wants and needs
Classification of group codes/themes	**Self-efficacy** – Beliefs about one's capability	**Urges** – Avoid penalty	**Wants** – Child does not want to use booster seat
	Belief – Risk to child with inappropriate fit/misuse	**Emotions** – Following intuition	
	Decision – Select safest seating option for child	**Negative emotions** – Child protests	
	Contemplation – Considering decision based on evidence and experience (including parent's perception of child's comfort)		
	Consequences – Risk perceptions for safety of child		
	Intentions –To ensure child is in the safest seating option		
	Goals – To ensure child is in the safest seating option		

Colour	Strength
Pink	Strong
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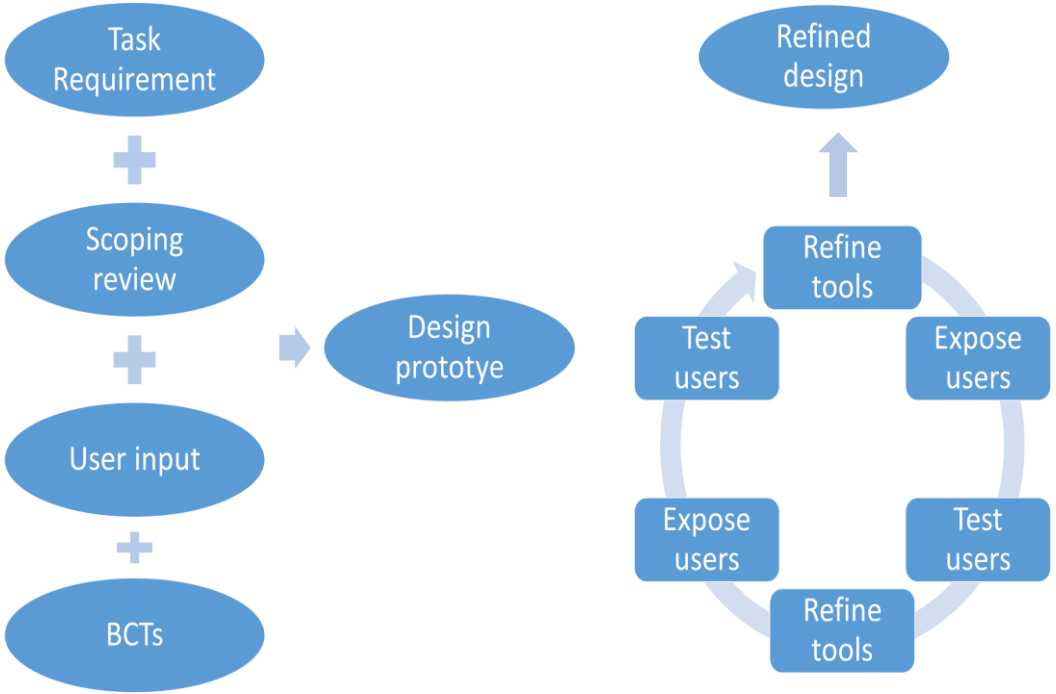
White	Weak

Study 2: Mapping – Opportunity

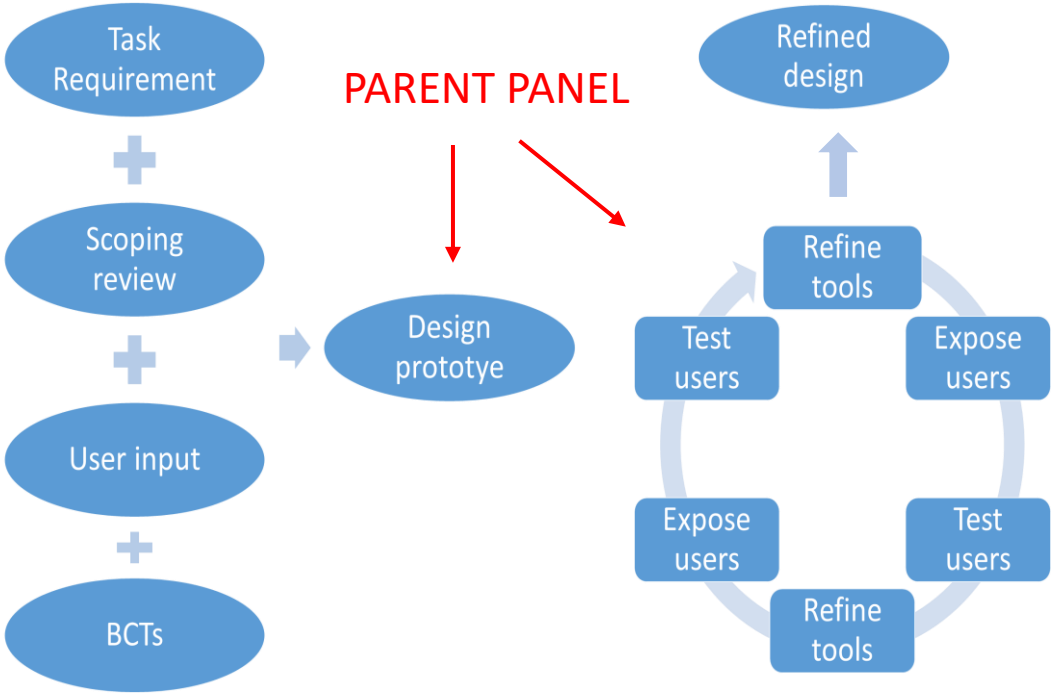
	Physical Opportunity: time, resources, location, prompts and cues	Social Opportunity: interpersonal influences, social cues and cultural norms
Classification of group codes/themes	**Resources** – other people transporting child; availability of booster seat	**Interpersonal influences/social support** – family/friends
		Social cues/comparison – Seeing behaviour in social setting regarding transition to adult seat

Colour	Strength
Pink	Strong
Gold	Moderate
White	Weak

Developing a user-driven, theory driven resource



Developing a user-driven, theory driven resource



Safe seatbelt fit for kids in cars

SuSTAInX Study
Supporting Successful Transition to Adult Belts In Cars

The George Institute for Global Health
WHO Collaborating Centre for Injury Prevention and Trauma Care

UNSW SYDNEY

5 Steps Needed for a Safe Fit

Step 1: Back against seat

Step 2: Seatbelt on shoulder

Step 3: Seatbelt low on hips

Step 4: Knees bent over edge of cushion

Step 5: Comfortably seated

Does your child have all 5?

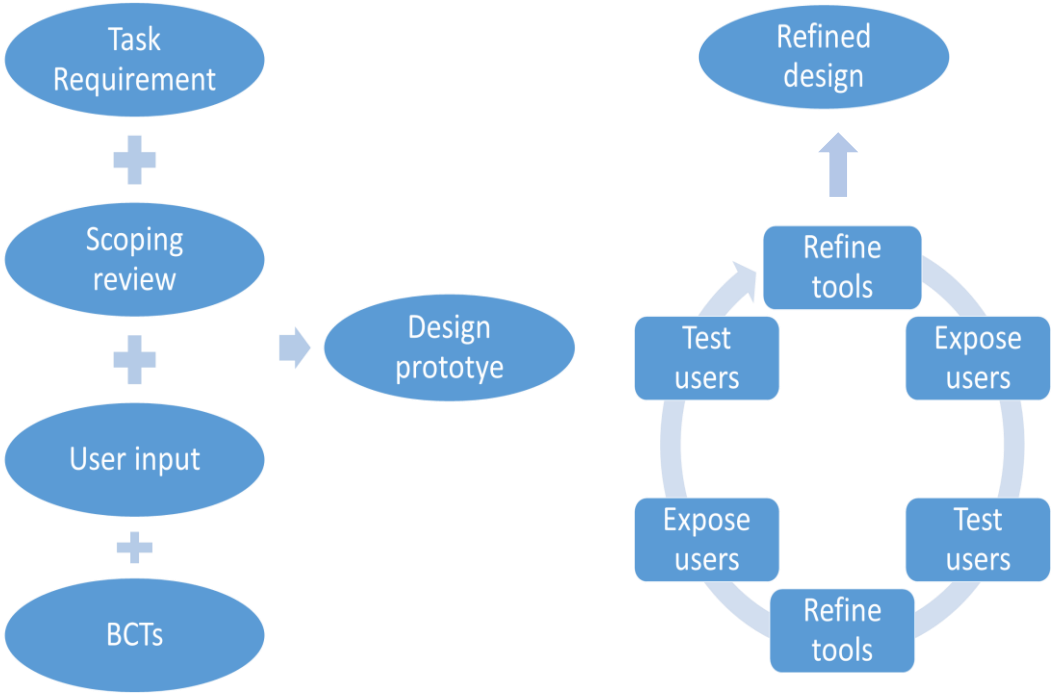
Then you're ready to drive!

Next →

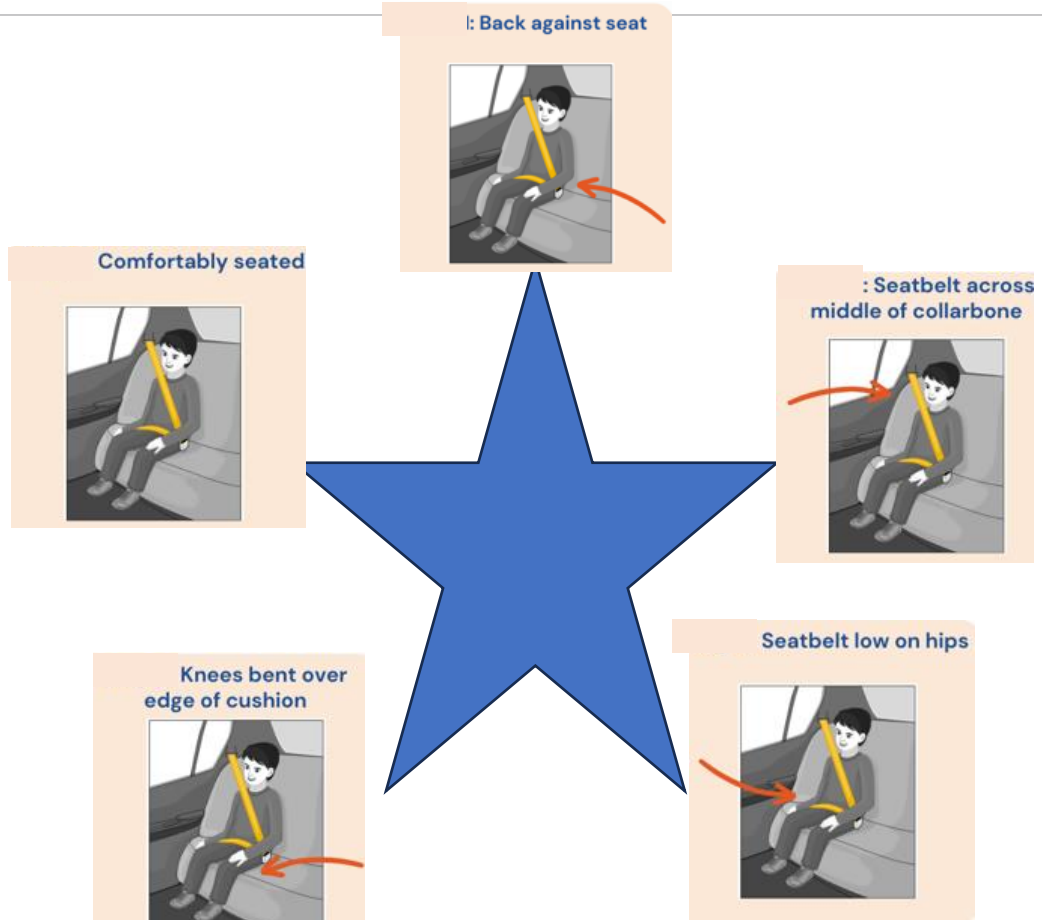
Developing a user-driven, theory driven resource

- Photographs & video demonstrating children achieving correct and incorrect fit for each criteria
- Explanation of why each criteria is important
- Info on consequences and risks for inappropriate fit
- Tips on managing complaints from children
- Myth busting
- Quiz to provide feedback on their understanding

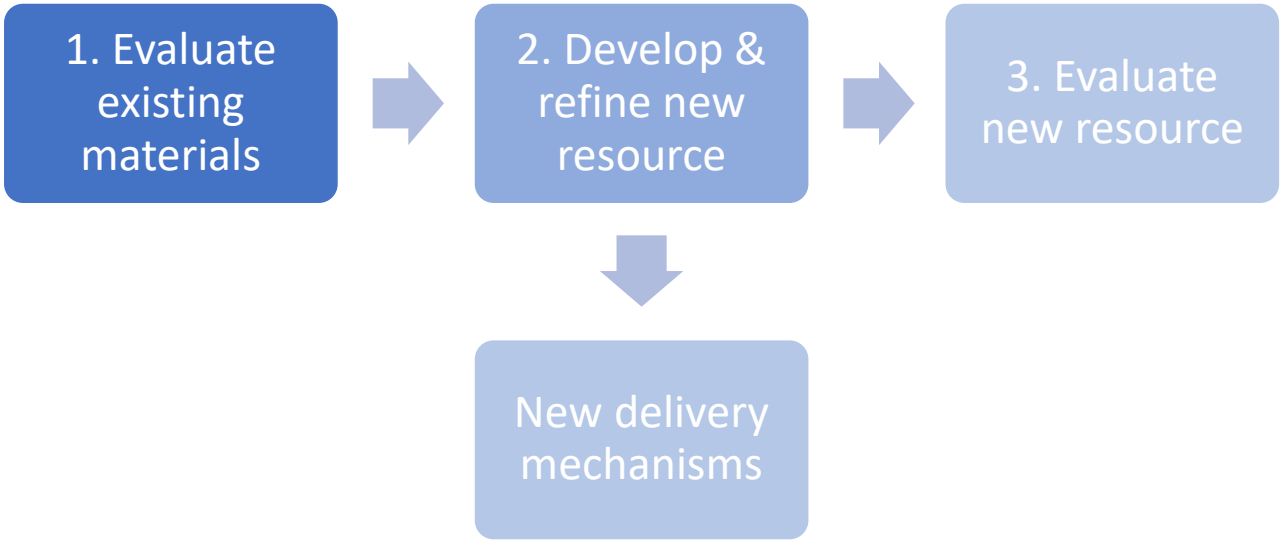
Developing a user-driven, theory driven resource



Check 5 for a Safe Seatbelt Fit for Kids



Going forward



Take home messages

- Asking a lot of parents to make these decisions
- Need to find new ways to help them & get this help to them
- Hoping our user centric and behaviour theory driven approach can do this

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Thank you

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- Thanks to all the families that participated
- Appreciation others assisting Wennie Dai[a], Catherine Ho[a], Nipuna Cooray
- Funding from Discovery Grant (Australian Research Council)
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c- Neuroscience Research Australia (NeuRA), Randwick 2031, Australia