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An update on research to identify solutions to misuse of child restraints in Australia

Julie Brown

UNSW SYDNEY

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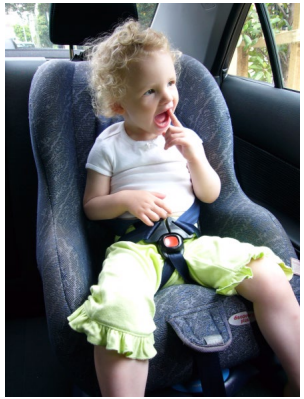
Outline

- Current child restraint practices in Australia
- Update on studies targeting misuse of restraints

Current child restraint practices

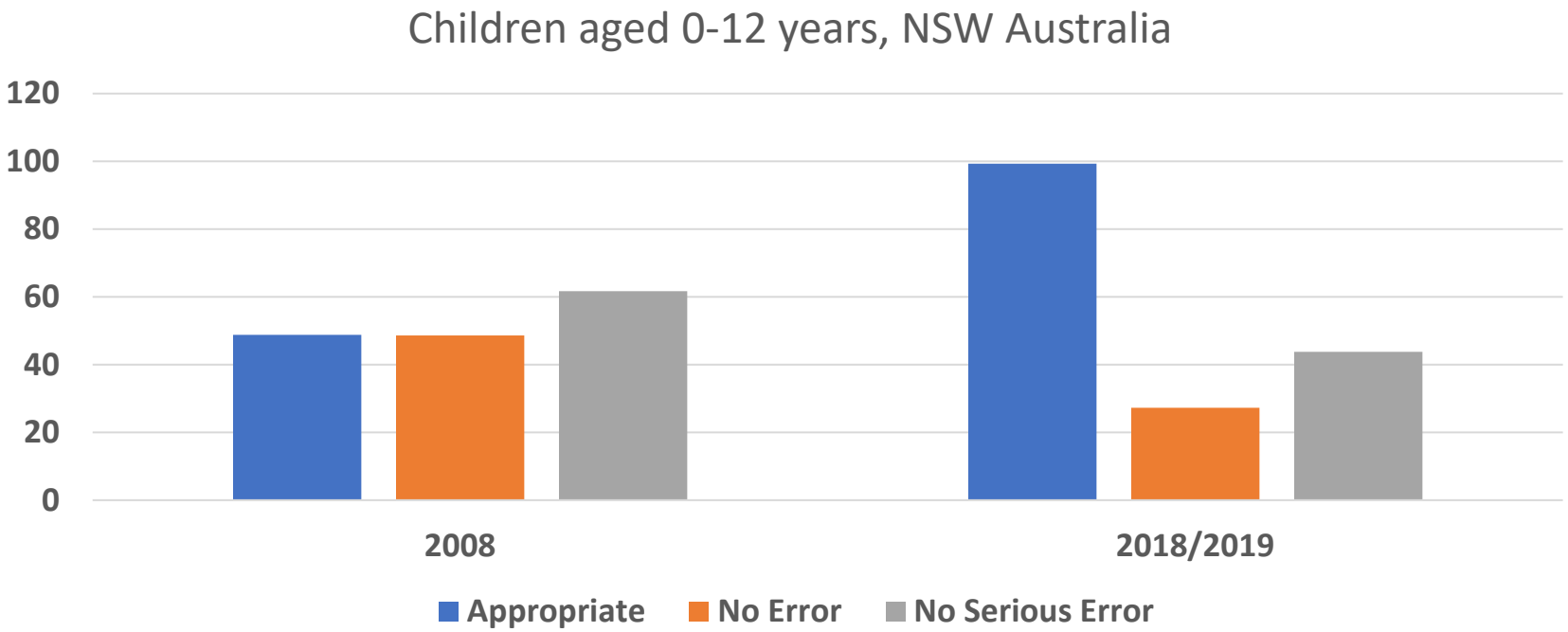
- High rates of restraint use by children in cars with >97% children using a restraint since late 1990's.
- Focus has been on optimising crash protection through use of most appropriate restraint, and correct use of restraints.

Inappropriate restraint/premature graduation



Incorrect restraint

Current child restraint practices



Tackling the problem of misuse

- User-driven design of child restraint product information
- Extending the reach of child restraint fitting assistance using virtual remote assistance technology
- Child restraint design

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User-driven design of child restraint information

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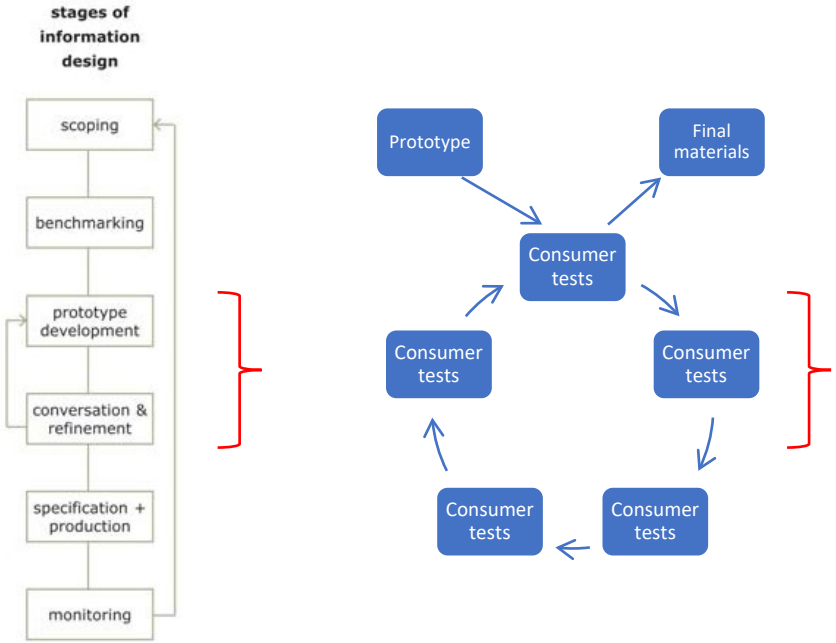
User-driven design of informative materials



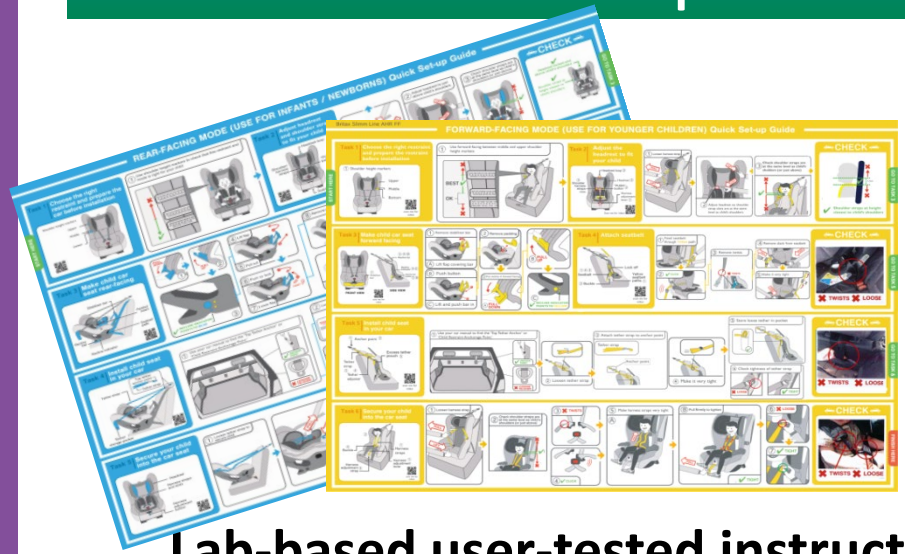
Users of this method in the context of written medicine information have reported that 90% of the weaknesses in the material can be identified within 10 cycles of testing.

Jay E, Aslani P, Raynor DK. User testing of consumer medicine information in Australia. Health Education Journal. 2010

Sless D. Usable medicines information. Communication Research Institute of Australia p-Paper, Hawker. 2001

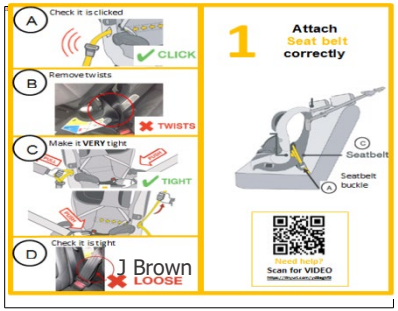
J Brown

New user-developed instructions



http://q-r.to/baoUit

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



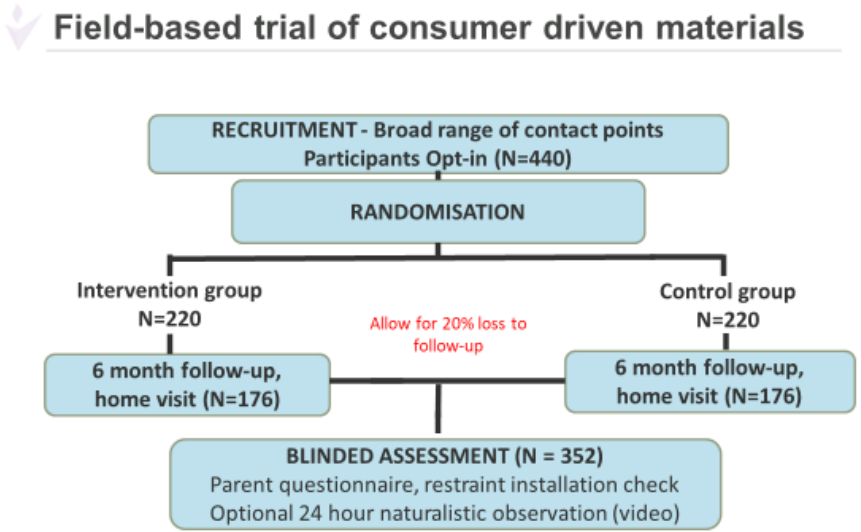
Completed NHMRC study focused on informative CRS materials

PROJECT TITLE: Enhanced methods of communicating correct use of child car restraints: A controlled trial

Original aims:

- to determine whether product information developed using a consumer-driven approach increases correct use of child restraints 6 months after purchase

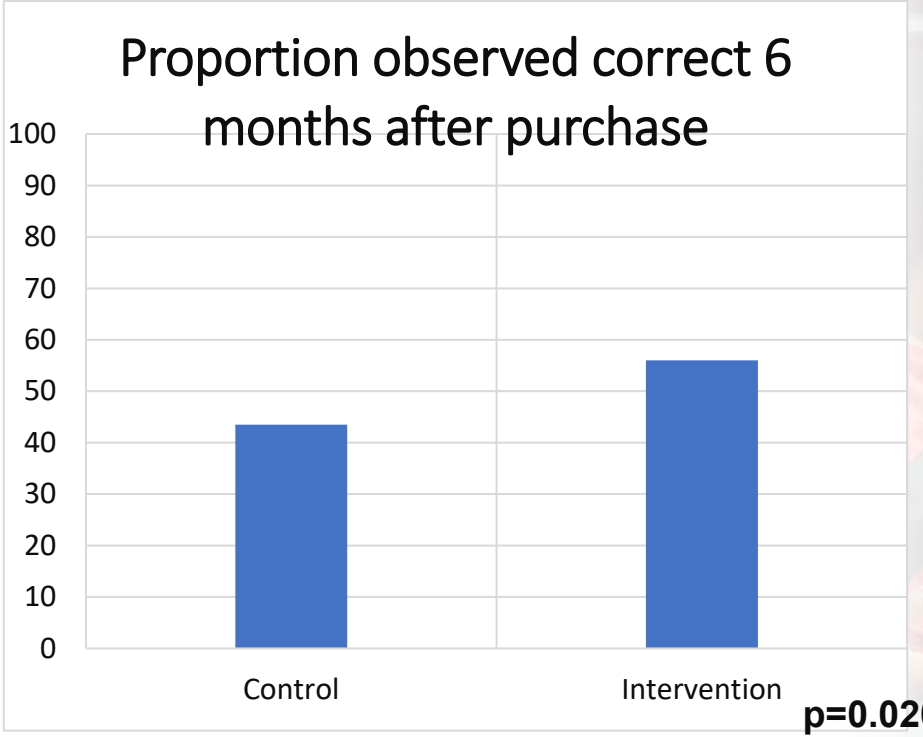
Enhanced methods of communicating correct use of child car restraints: A controlled trial



- Recruited n=**427**
- Withdrawn/Lost to follow-up n=**14 (3.3%)**
- Completed home visits (including in-person and remote) n=**413**

Field trial

- Primary outcome (difference in proportion of people with serious errors observed six months after purchase of the restraint
  - 56.2% in control group and 44.7% in the intervention group (p=0.020).
  - Odds of serious error in control compared to intervention was 1.58 (95%CI 1.07-2.34)
- Secondary outcome (difference in number of errors between groups)
  - Mean errors in control was 2.4, in intervention was 1.7 (p <0.001);



Guidelines developed for manufacturers

Method - Lab trial

Recruitment through a mix of strategies (N=44)

RANDOMISATION

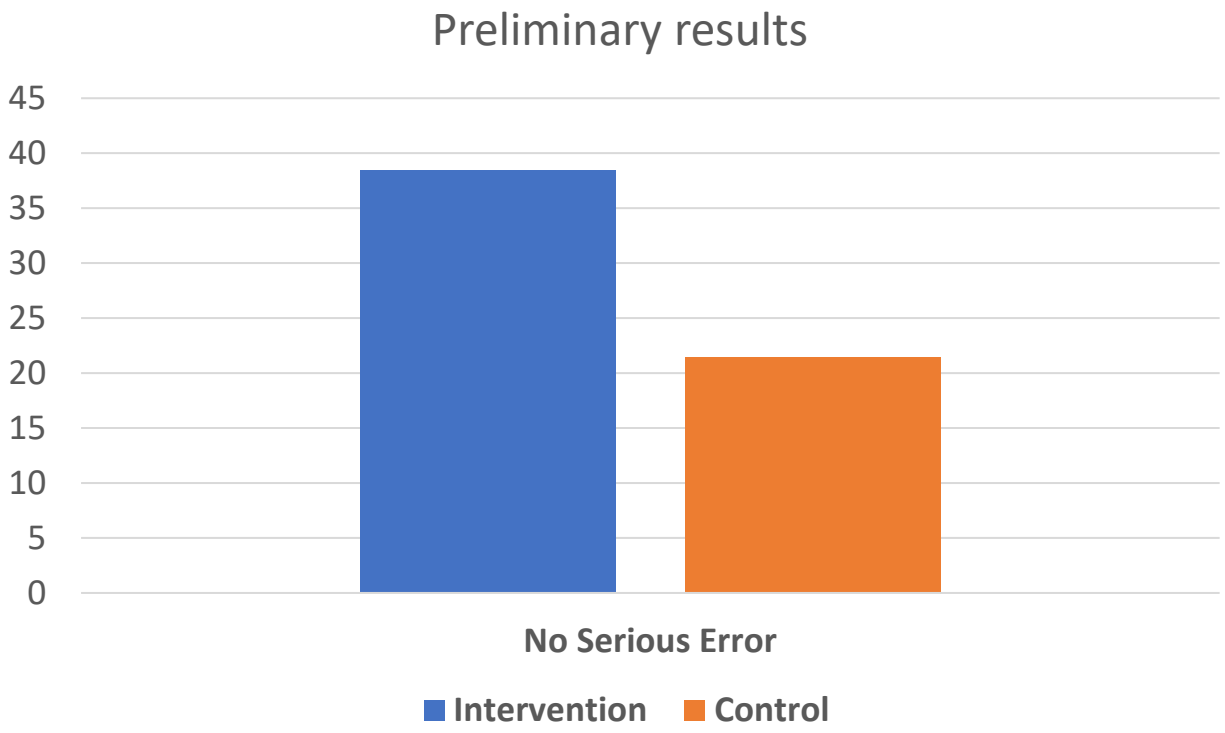
INTERVENTION GROUP (Instructions following guidelines, N=22)

CONTROL GROUP (Standard manufacturer's instructions N=22)

Check for errors in restraint installation & dummy-child secured within CRS (BLINDED)

Verbal comprehension test (NOT BLINDED)

Guidelines developed for manufacturers



Extending the reach of child restraint fitting assistance using virtual remote assistance technology

- Families who use child restraint fitting/check services >2 times more likely to be correctly using restraints
- Only about one in three families use these services
- Access to services is low away from cities

TRAFFIC INJURY PREVENTION
2017, VOL. 18, NO. 2, 188–192
http://dx.doi.org/10.1080/15389588.2016.1225204

Taylor & Francis
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Teaching infant car seat installation via interactive visual presence: An experimental trial

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ABSTRACT

Objective: A large portion of child restraint systems (car seats) are installed incorrectly, especially when first-time parents install infant car seats. Expert instruction greatly improves the accuracy of car seat installation but is labor intensive and difficult to obtain for many parents. This study was designed to evaluate the efficacy of 3 ways of communicating instructions for proper car seat installation: phone conversation; HelpLightning, a mobile application (app) that offers virtual interactive presence permitting both verbal and interactive (telestration) visual communication; and the manufacturer's user manual.

Methods: A sample of 39 young adults of child-bearing age who had no previous experience installing car seats were recruited and randomly assigned to install an infant car seat using guidance from one of those 3 communication sources.

Results: Both the phone and interactive app were more effective means to facilitate accurate car seat installation compared to the user manual. There was a trend for the app to offer superior communication compared to the phone, but that difference was not significant in most assessments. The phone and app groups also installed the car seat more efficiently and perceived the communication to be more effective and their installation to be more accurate than those in the user manual group.

Conclusions: Interactive communication may help parents install car seats more accurately than using the manufacturer's manual alone. This was an initial study with a modestly sized sample; if results are replicated in future research, there may be reason to consider centralized "call centers" that provide verbal and/or interactive visual instruction from remote locations to parents installing car seats, paralleling the model of centralized Poison Control centers in the United States.

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KEYWORDS
Car seat; child restraint system (CRS); infant; injury prevention; safety; interactive visual communication

Health Communication

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Supporting Caregiver Use of Child Restraints in Rural Communities via Interactive Virtual Presence

Marissa Swanson, BPhil[1], Morag MacKay, MS[2], Sophie Yu, BS[3], Alexis Kagiliery, MS, CPSTI[2], Koren Bloom, CPSTI[4], and David C. Schwebel, PhD[1]

Abstract

When used correctly, child restraint systems (CRS) effectively reduce the risk of serious injury and death to child passengers in motor vehicle crashes. However, error rates in CRS use among caregivers are extremely high. Consultation with child passenger safety technicians (CPST) reduces misuse rates, but access to CPST is limited, particularly in rural areas. Remote consultation via interactive virtual presence (IVP) may increase access to CPST. One hundred and fifty caregivers in Southeast Montana completed remote consultation with CPST via IVP. Errors in CRS selection, installation, and child positioning were coded at baseline and postintervention in a within-subjects, pretest–posttest design. The proportion of caregivers making one or more errors in CRS selection (McNemar's test $p < .001$) and installation (McNemar's test $p < .001$), but not child positioning, significantly decreased following remote consultation. IVP is a promising mobile health (mHealth) strategy for providing remote consultation with CPST to improve rates of correct CRS use and mitigate child injury risk.

Brief report

Virtual car seat checks during a pandemic

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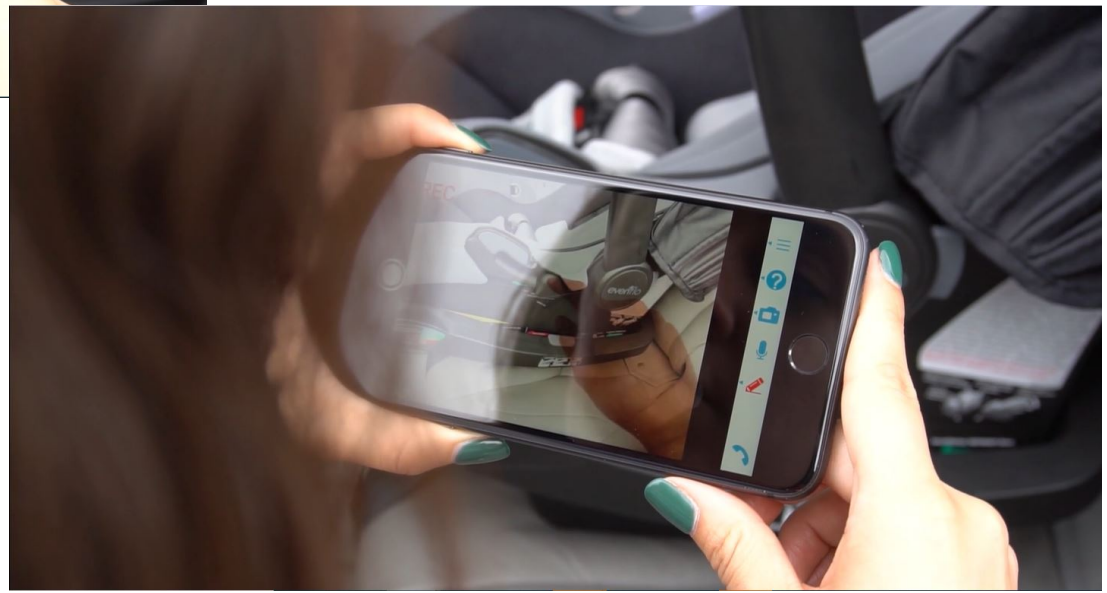
ABSTRACT

Motor vehicle collisions are one of the leading causes of death and morbidity in children and young adults in the USA, and suboptimal child restraint use is an important risk factor for severe childhood injury and death. The restrictions due to the COVID-19 pandemic have presented unique challenges to the public health community, including how to use certified child passenger safety technicians through car seat checks. This case series assessed the feasibility of performing remote car seat checks and parental satisfaction with them. It provides preliminary evidence that remote car seat checks are feasible in a real-world environment and acceptable to caregivers during times in which in-person car seat checks are not safe or accessible.

tablet, if they did not have regular access to a car, if the mother and infant were not to be discharged together, or if the infant was premature or had other special needs requiring CSS modifications. After informed consent, all participants received an in-person car seat check on discharge from the newborn nursery as part of the randomised trial, with a plan for all participants to receive another in-person car seat check at 9 months. Due to the pandemic, updated institutional review board approval was obtained for permission to perform the car seat checks remotely at the 9-month time point. These results are presented here.

The car seat check took place at the location of the caregiver's choice and required access to the internet or wi-fi for use with their tablet or smartphone. The instruction was provided by one of two

Inj Prev: first published as 10.1136/injuryprev-2020-044009 on 3 Decem



Help Lightning
(https://helplightning.com/)

The George Institute
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Extending the reach of fitting services

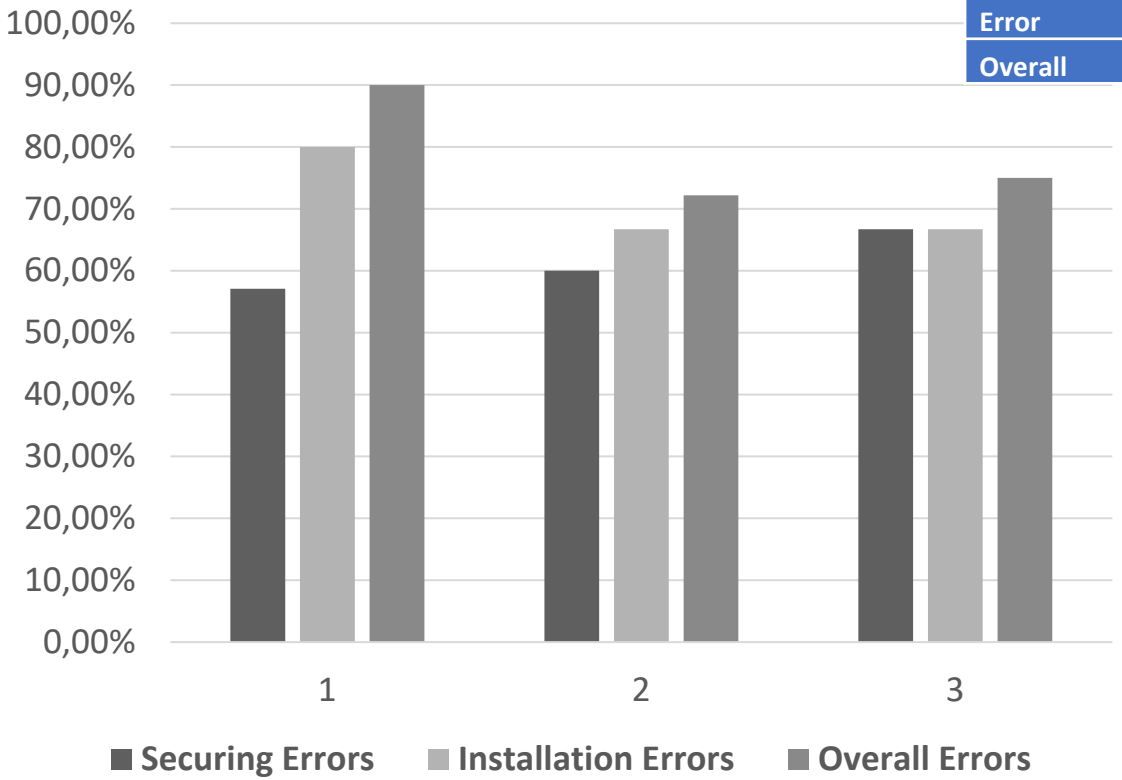
Aim: is to identify a cost-efficient delivery method for providing assistance and education to increase correct use of child restraints in rural and remote Australia.

-a 3-arm single blind randomised controlled trial. 3 study groups with 125 participants in each study group. The study aims to recruit **375 participants** in total.

- COVID interrupted and only achieved about a third of the sample

Results

	Group 2	Group 3	Group 1
Securing Error	1.12 (0.11-11.59)	1.50 (0.09-25.39)	Ref
Installation Error	0.5 (0.11-2.17)	0.5 (0.10-2.54)	Ref
Overall	0.29 (0.05-1.73)	0.33 (0.05-2.34)	Ref



- No significant differences
- Do see a trend in less installation errors, and errors overall in groups 2 and 3
- Little difference between groups 2 and 3

Results - Acceptability

- In person and Virtual ‘more useful’ than online video, more people found in person ‘more ‘ useful than virtual
- In-person rated ‘appropriate’ more often
- No difference between groups in ‘difficulty’
- Both in person and virtual – more ‘worth the effort’ , higher ‘perceived effectiveness’ and high level of ‘self-efficacy’ –compared to the video
- Virtual found to be ‘more of a hassle’ –

Child restraint design & propensity for error

- 3 studies completed to date
  - Re-analysis of some naturalistic driving study data
  - Naturalistic driving trial
  - Real world observation data
- More studies underway

Child restraint design & propensity for error

Contents lists available at ScienceDirect

Safety Science

journal homepage: www.elsevier.com/locate/safety

Influence of child restraint system design features on comfort, belt fit and posture

Bianca Albanese[a,e,*], Katarina Bohman[b], Lynne Bilston[a], Sjaan Koppel[c], Judith L. Charlton[c], Jake Olivier[d], Lisa Keay[e,f], Julie Brown[a,e]

Traffic Injury Prevention

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/gcpi20

Child restraint headrest and belt routing design features and their association with child passenger behavior and restraint misuse

Bianca Albanese, Suzanne L. Cross, Julie Brown, Lynne E. Bilston, Sjaan Koppel, Katarina Bohman, Kristy B. Arbogast, Jake Olivier & Judith L. Charlton

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Child restraint design & propensity for error

- Provide evidence of likely impact of child restraint design on child behaviour in cars
- Design influences behaviours related to suboptimal restraint such as belt and harness misuse, and child position
- More work required to definitively understand optimal restraint design

Albanese B et al, Safety science. 2020 Aug 1;128:104707. : Albanese et al Traffic injury prevention. 2022 Oct 3;23(7):446-51

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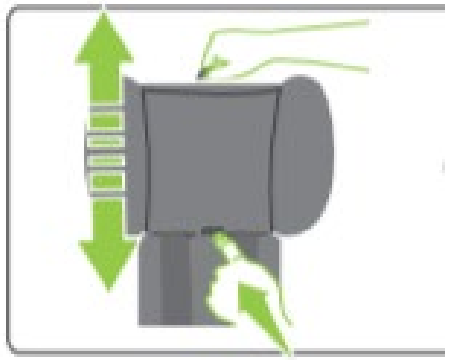
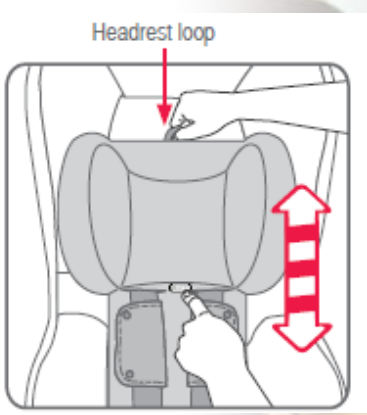
Field Study

- Field observation study
- Identify groups of child restraint design features with the lowest propensity for error
- Focus on 3 main tasks where errors can be introduced (by parent/carers)
  - Adjust harness strap height
  - Installation with a seatbelt or ISOFIX
  - Installation using the top tether
- Design features were grouped by manually reviewing the data
- Task-related errors marked as PRESENT/NOT PRESENT

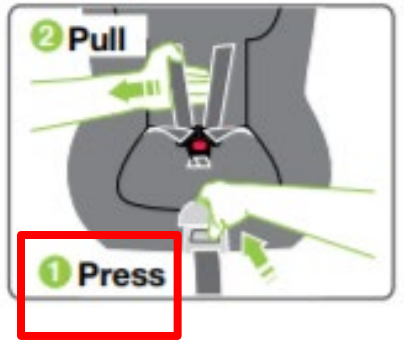
Group	Harness
Group 1	Height adjustable headrest, linked headrest and harness height adjustment, lever harness adjustor
Group 2	Height adjustable headrest, linked headrest and harness height adjustment, button harness adjustor
Group 3	Height adjustable headrest, unlinked headrest and harness height adjustment, lever
Group 4	No height adjustable headrest, unlinked headrest and harness height adjustment, lever harness
Group 5	Not height adjustable headrest, unlinked headrest and harness height adjustment, button harness adjustor
Group 6	Other



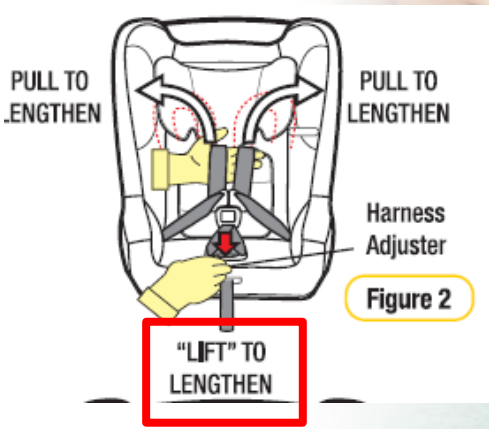
Height adjustable headrest



Linked height adjustment

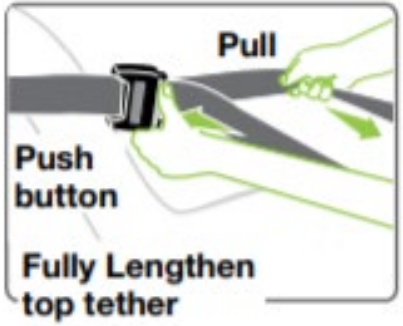


Button adjustment

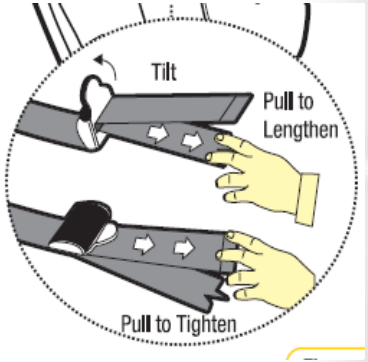


Lever adjustment

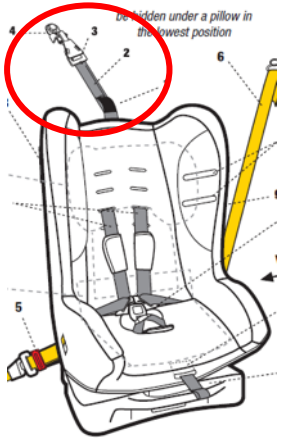
Group	Upper Anchorage
Group 1	Button top tether adjustment mechanism and single tether strap
Group 2	Button top tether adjustment mechanism and double tether strap
Group 3	Latch plate top tether adjustment mechanism and single tether strap
Group 4	Latch plate top tether adjustment mechanism and double tether strap



Button Adjuster



Latch plate Adjuster

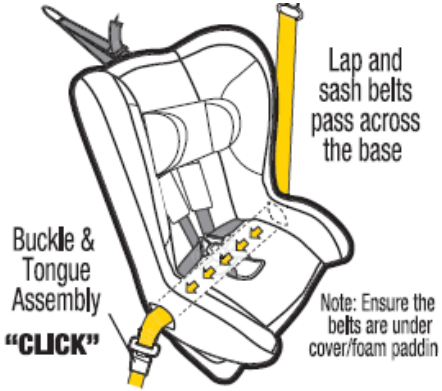


Single Strap

J Brown

Double Strap

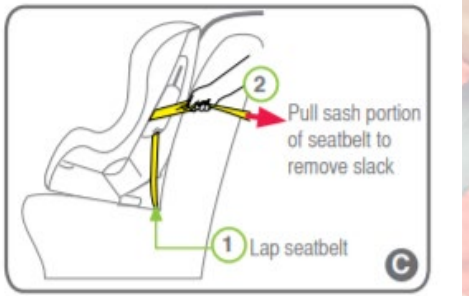
Group	Lower Anchorage	
Group 1	Seatbelt routed across base, partial access	Seatbelt
Group 2	Seatbelt routed across base, no access	ISOFIX
Group 3	Seatbelt routed other, partial access	
Group 4	Seatbelt routed other, no access	
Group 5	ISOFIX	
Group 6	Other	



Routed across base. No access

ISOFIX

Partial access



Routed other. Partial Access

Summary

- Indication we may be on right track
- Limitations in trying to study this in the real world
- Now moving to a more controlled laboratory approach

Thank you.

https://www.youtube.com/watch?v=SfPmi2UreUg