Qualitative Consumer Input for Enhancing Child Restraint Product Information to Prevent Misuse: Preliminary Results

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Abstract

Child restraint system misuse is a global public health issue leading to increased risk of injury and death in motor vehicle crashes. Although some interventions are effective at reducing misuse, they are prohibitively costly to adopt at a population-level. We aim to develop a novel, consumer-driven intervention to counter misuse embedded in product information supplied with child restraints. If effective, this cost efficient measure can be broadly implemented via product standards. The first stage of this project involved using a semi-structured discussion guide to conduct six in-depth focus groups (N = 44; 95% female) to elicit problems and preferences with current product information. There are some distinctions between the different populations of child restraint users sampled here (i.e., reliance on graphics versus text instruction), but preliminary results suggest that at a minimum, restructuring information, improving graphics, removing text, and providing links to other sources of information will increase the attractiveness and ease of understanding instructions and labels supplied with child restraint systems.

Background

Child restraint systems (CRS): *Nonuse, misuse, and age-inappropriate use*

The use of child restraint systems (CRS) for children travelling in motor vehicles is common in most developed countries and it is becoming the norm for legislation to cover the protection of children in cars worldwide (WHO, 2013). In Australia, the law requires that children under seven years of age be restrained in an approved booster seat or child restraint system that is appropriate for the child's height and weight. Recent estimates of use have predicted that more than 99% of children 0-7 years are restrained (Brown et al., 2010).

The same estimates predict that about half of all children are *incorrectly* restrained (Brown et al., 2010). While mandating the use of a child restraint might promote use, it does not ensure the seat is being used correctly; that is, installed and used as intended by the manufacturer. Correct use is predominantly measured by the presence or not of errors in installation (CRS in vehicle) or securing (child in CRS) (e.g., Rudin-Brown et al., 2004). Very loose or twisted harnesses, seatbelts routed incorrectly, and non-use of a top tether are examples of serious errors that would reduce the restraints' crash protection potential (Brown et al., 2011). As more countries mandate restraint use and population estimates of use increase, the focus of child passenger safety is now shifting to preventing misuse from promoting appropriate use. A number of studies have identified demographic factors associated with an increased likelihood of errors in use. Brown et al. (2013) found that children from a family who speak a language other than English at home are more than twice as likely to be incorrectly restrained. Children from low-income families have also been found to be substantially more likely to have errors in child restraint or booster seat use (Bilston, Du, & Brown, 2011). While Bilston et al. (2011) did not find a significant relationship between education level and restraint use, other research indicates that lower health literacy (ability to understand and use health information) is associated with low injury prevention behaviours

(Heerman et al., 2014). Lack of information and experience with restraints are also predictors of misuse (Arbogast, 2014; Bilston et al., 2011; Rudin-Brown et al., 2004).

Some predictors of incorrect use (i.e., lack of information and experience, low health literacy, etc.) suggest that the misuse of restraints is due to a user's skill deficit. Information on how to use a restraint is communicated on the labels and instruction manuals accompanying the restraint. It is inevitably the first point of communication for new restraint users. In Australia, all child restraints must be approved under the Australian Standard AS/NZS 1754. It is this product standard that stipulates the content and layout of information given to consumers about installation and use of child restraint devices. And while product information provides instructions on correct use and warnings against misuse, continuing high rates of errors in use suggest there is a gap between the correct use messages being sent and how users are responding (using) the restraint.

Basic communication principles suggest that there are characteristics of the message (i.e., correct use), channel (i.e., instruction manuals/labels), recipients (i.e., child restraint users), and environment (i.e., first time) that will affect how information is processed. Although most research on communication for health is focused on patient decision-making in clinical care situations, there are some public health and literacy principles concerning risk communication and medical product information (Fischhoff, Brewer, & Downs, 2011). The gold standard in health communication also involves taking a consumer centric approach to the development of information materials. While child restraint users have typically been seen as passive recipients of safety information, there is a move in health research toward designing consumer-centred information.

Researchers in Australia, Canada, and North America have recently developed some educational interventions targeting restraint misuse that involve consumer-centred design processes. In Australia, the product standard for child restraints (AS/NZS 1754; 2010) was amended to include shoulder-height marker labels affixed to restraints that visualised for parents when a child had outgrown their restraint (child's shoulders are above dotted line). Although the law still makes recommendations of appropriate restraint use based on age, the shoulder height markers being used were designed using size of child (height) as a proxy for appropriate use – an indication leading to more appropriate use (Brown, Fell, & Bilston, 2010). In 2002, Rudin-Brown et al. (2004) designed new 'optimal' labels for child restraint systems that were aligned with human factors principles that performed better than the traditional label for rearward-facing mode installation and use. More recently, Klinich et al. (2010) and Kramer et al. (2015) found similar results with instruction manuals and labels they designed. However, despite the fact these studies used best practice in designing the information, and the participants in these studies were highly motivated to perform correctly, and had access to correct information in an appropriate format, the absolute improvement in errors was relatively small. This indicates that a communication gap between the information being conveyed in the instructions and labels and the information received and enacted continues to exist.

We believe that the critical step to ensuring users can understand and act on instructions and labels is by involving them in the process of design, and continuing re-design until the behaviour is being performed correctly. A modified consumer-testing and consensus design method is being used to design new instructions, labels, and videos that aim to increase the correct use of restraints. The consumer-centred design *process* is the critical step to success, not the re-designing of materials themselves. With the final prototypes of enhanced instructions and labels, we will then be able to look retrospectively into the critical elements of design and feedback that made the most significant changes and translate these processes into recommendations for manufacturers.

The first stage of this consumer-centred design process is qualitative focus groups to identify barriers to using and understanding current child restraint product information in a diverse population of users.

We aim to elicit specific feedback on how to improve current child restraint informative materials. The preliminary results presented below are being used to design the first prototype of new child restraint product information to be tested in a consumer-testing cycle and later laboratory trial.

Method

Six focus groups were conducted to explore consumer preferences on content, format, and appearance of current child restraint system product information. To capture the diversity of child restraint users and their needs, we conducted two groups of participants who are from high income and high education brackets (high SES), two groups of participants from culturally and linguistically diverse (CALD) communities, and two groups of participants who are classified as living in an area of socioeconomic disadvantage (low socioeconomic status; low SES) according to the Australian Government Socioeconomic Index For Area (SEIFA; Australian Bureau of Statistics, 2013).

Sample

High socio-economic status participants were recruited using a study brochure and email distribution through university and research channels, and asked to register their interest to participate in an online screening survey. CALD community participants were recruited using study brochures given out by moderators in community playgroups in southeastern Sydney. Local community organizations for CALD parents assisted with the recruitment of these participants. We recruited potential low SES participants through community playgroups in low SEIFA areas in the greater Western Sydney area. Participants were eligible to participate if they: a) were aged over 18 years of age, b) have used a child restraint system to transport children, and c) were conversant in English.

Procedure

Focus groups were held at Neuroscience Research Australia (NeuRA - two focus groups) and in the community (four focus groups). Each group was moderated by a member of the research team using a semi-structured discussion guide, and one other researcher attended the group to take notes. Participants provided written consent and completed a screening questionnaire either online or in person which included demographic information and past experience with child restraint use.

The focus groups were structured such that participants were first asked to reflect on their experiences using child restraint systems. Next, participants were presented with five convertible child restraint systems currently on the market in Australia. Restraints were selected that fulfilled the following criteria: a) with and without self-adjusted headrest and harness combinations; b) convertible design (high propensity for misuse); c) currently on the market in Australia and expected to stay on the market for the next five years; and d) conforms to the Australian Standard for Child Restraints (AS/NZS 1754:2013).

The restraints included three rearward facing/forward facing convertible restraints, and two convertible forward facing/booster restraints.

The discussion guide was developed using review of the literature on consumer preferences related to health communication, principles in communicating with people with lower health literacy, and previous research on problems using child restraint system. The guide was formulated to encourage

reflection of potential modification of content and format of product information typically supplied with child restraint systems. Some specific prompts included: finding specific pieces of information related to areas of high misuse propensity, general impressions of instruction manuals or labels, ordering of information, previous experience and feedback on text size, drawings, and manufacturer videos.

The focus group discussions were audiotaped and then transcribed and de-identified. Audio-recordings were deleted following transcription. The University of New South Wales Human Research Ethics Committee (HC15547) approved the study.

Data Analysis

Six focus groups were conducted, with four audio-recordings transcribed in full. Two focus groups (one CALD group and one low SES group) were held during playgroup hours and extensive background noise prevented transcription. For the purposes of thematic analysis, the combined discussion notes taken by the group moderator and observer are used in place of transcripts.

Two researchers read each transcript and discussion note document independently and identified key content areas. These key content areas were used to code the transcripts and discussion notes into relevant themes. Overlapping themes were merged. The use of flexible content analysis allowed us to capture all instances of a theme being present in conversation, explore the context in which these issues were raised, and general agreement or disagreement within and between groups. The results presented below are the preliminary higher-level findings.

Results

A total of 44 participants (95% female) attended the six focus groups. Two groups were classified as having high income and education (high SES; n = 8), two groups of participants from CALD communities (CALD; n = 12), and two groups were held with participants from low socio-economic areas in Sydney (low SES; n = 24). Key themes emerged across the following content and format areas: appearance, format, readability, information needs, and videos.

Within and between groups, there was consensus on installation being an important but difficult task, and consensus that instruction manuals and labels do not provide sufficient information to ensure correct use.

Appearance of instructions and labels

Colour. The instruction manuals and labels were viewed by all groups as having sufficient colour coding to determine differences between modes of configurations. Important information presented in yellow and warnings presented in red were congruent with the participant's pre-conceived knowledge and preferences for use of colour.

Pictures/diagrams. The high SES group found that instruction manuals had sufficient diagrams and pictures to aid installation; the low SES reported the need for more diagrams and pictures; and the CALD groups rated the current pictures as unrealistic and uninformative. It was noted that CALD participants are more likely to use pictures as the sole source of instruction, whilst other groups use pictures to help understanding of text. The same was true for CALD participants concerning the pictures and diagrams on labels affixed to the restraint:

"Yeah maybe more pictures. More pictures, more than letters, but pictures that we can understand better" (CALD)

And both the CALD and low SES groups called for more realistic diagrams and graphics to be used for pictures on the restraint.

"…more real life, that would be easier…" (Low SES)

Location of labels. When examining labels affixed to the restraint, the high SES group pointed out that text heavy information was typically toward the bottom of the restraint; manufacturers should consider placing labels in the line of sight of the user when the seat is in the car.

Readability

For CALD groups, instruction manuals not being available in their primary languages was the main concern expressed. Labels can be improved by simplifying text, removing unnecessary words, providing other language options, and increasing font size. All groups reported that instructions and labels are text heavy and would benefit from less text and more diagrams or pictures. While most high SES participants found the instructions easy to read, all groups reported that text should be simplified.

"I look at that and – I'm the person that reads every word and instruction – but honestly I look at that and I just shut down 'cause it's too much information. There's too many words" (Low SES)

Format

Order of information. There was a consensus across both the high and low SES groups that the instruction booklet should be ordered to reflect the order of tasks: pre-installation adjustments, installation, and then securing information. The high SES group recommended that each instruction manual have a quick set up guide and triage system at the beginning of the manual to guide the user through subsequent tasks. It was also recommended that the booklet should be separated based on mode of installation; different sections of the manual should focus on only one mode of configuration or separate manuals completely for different modes. For the labels, the CALD group asked specifically for simple, ordered, and numbered steps to perform the installation.

Warnings. Although group members in the high education group noticed and valued the warnings on the restraint, one participant pointed out that they would become redundant over time with exposure. While all focus group members seemed generally concerned with the safety of their children in cars and ensuring that they were correctly using seats, one group called for better labeling and warnings on the restraint to prompt other people securing their children in the car to do so correctly:

"Definitely for your partner … have a big thing saying: fasten me tight!"

And also to remind users to untwist straps on the harness by placing labels on the straps themselves prompting removal of twists:

"… So I think if there was a big warning that your child is going to have a punctured spleen or something if this [strap] is twisted… the more information there is on the seat - I think - the better"

Information needs

Mode of configuration. The CALD groups expressed confusion about installing the seat in the mode that is appropriate for their child. The instructions and labels report on age, size, and weight requirements indicators for choosing the mode to install the restraint. The CRS has shoulder

height markers as well. One CALD participant gave an example of conflicting information regarding which configuration to use for their child:

"*That's why it's a little bit confusing, because it says from two to three […] but then they said forward facing from twelve months to four years so they have two information?"*

How to correct misuses. More specific information is needed on how to act on warning information when warnings are made about incorrect use. For example, providing information about how to make adjustments to tether straps:

"… No, I'm not even sure it clearly tells you how to remove the slack, it just tells you to make sure the slack is removed."

Need for feedback on performance. The high SES and CALD groups consistently expressed the need for reassurance that they were performing installations successfully. One participant noted that the use of checkpoints for critical behaviours would increase confidence of installation success.

"It's all very well having a statement saying, 'Make sure strap is finely secured', but what about a test or demonstration to yourself that you've achieved that part of the task?"

Links to more information. All groups provided information about consulting other sources of information regarding restraint installation and use (i.e., YouTube videos, websites, manufacturer hotline). It was recommended by the high SES and CALD groups that links to other reliable sources of information be provided in the instruction manuals. It was suggested that a link to online video tutorials for installation demonstration should be permanently affixed to the restraint.

Videos

Across all groups, participants are receptive of video demonstrations as sources of instruction. Users are actively looking for videos on the web to clarify issues with installation (e.g., needing to adjust seat before threading belt through belt paths). However, the CALD group found manufacturer videos to be too general and not focused on problem solving:

"I did [see manufacturer's videos]. I tried to find manufacturers video but it didn't show me what I found in the YouTube video".

This group also spoke about the importance of using instructors/models on demonstration videos that are relatable and 'real'. The high SES group valued information coming from a trusted source. They noted that videos should be recorded and distributed through the manufacturer's official media channels, with direct links to these on the products and in instructions.

Discussion

The findings from this work have been used to develop a set of preliminary recommendations pertaining to re-design of instruction manuals, labels, and videos. These include:

i. Re-ordering information in manuals and on labels to reflect the order of performing installation

ii. Provide a triage or checklist system at the beginning of the manual and in labels to guide use

iii. Simplify text, and remove unnecessary text and repetitive warnings on labels

iv. Provide specific warnings for tether and harness twisting on the labels

v. Provide instructions in languages other than English, and if not possible then:

vi. Make diagrams and pictures more realistic to aid understanding (both manuals and labels)

vii. Provide feedback on performance for key tasks, for example installation checks and information for the user to self-check their performance

viii. Provide links to other reliable sources of information or videos in manuals and on labels

ix. Simplify by separating manuals by mode of installation and removing ambiguous information

x. Place labels in line of sight of user, and increase font size

xi. Manufacturer video should be short, problem-focused, and feature relatable role-models

Even though the recommendations above were not brought up in all focus groups, there were no disagreements between groups on the majority of suggestions made. For example, even though two high SES groups were the only to suggest change in placement of labels on the restraint, no information from other groups contradicted this recommendation. It is important to note that different themes emerged from different groups, and this highlights the need to ensure work with child restraint users samples a diverse range of users to address universal needs.

The only disagreement between demographics groups in this study was on preference for diagrams and pictures over text in instruction manuals. The high SES group found that the number and type of diagrams were sufficient in addressing their needs, while the CALD groups identified a need for more and better pictures. As mentioned by one CALD group, pictures and diagrams are used in the place of text as the main source of instructional information when instructions were hard to read and understand. This could explain the reliance on pictures.

Participant recommendations versus previous CRS research

In their report for the U.S. Department of Health and Human Services, Fischoff et al. (2011) provided a guide to best practices in labeling medicine products to promote correct use. As both labels on medicines and on child restraints aim to authoritatively persuade user's to perform a specific sequence of behaviours, it is not surprising that recommendations in this report overlapped with the themes that emerged from this study: a) organize label components to reflect how the instructions will be processed, b) emphasize critical information, c) simplify language, d) limit auxiliary information, e) address English proficiency by providing multiple language translations, and f) font – high-contrast, simple, large.

Although information needs tend to be similar across health disciplines, direct comparison with the findings of previous studies using child restraint information is pertinent. Similar to findings relating to labels and/or instructions designed by Rudin-Brown et al. (2004) and Klinich et al. (2010), participants in this study asked for information to be ordered in the sequence it needs to be performed and for text to be simplified to increase readability. In the current study, participants requested that the pictures and diagrams resembled the actual seat and tasks more realistically (e.g., using a photo of the restraint instead of a black and white 2D drawing). The only condition to decrease errors in use significantly after controlling for other conditions was improved graphics (Klinich et al., 2010). A high preference for video instructions in the current sample is in support of Klinich et al. (2010).

A key finding here is that the warnings for misuse in instructions and on labels are not engaging. A participant noted that they wouldn't pay attention to the risk statement due to familiarity. Reducing large text warnings was a recommendation made by Kramer et al. (2015) in their report to Transport Canada.

Kramer et al. (2015) reported that instructions should be explained using a combination of pictures and text, with *text being used for more abstract tasks*. With inclusion criteria requiring participants to have no difficulty reading or writing English, expectedly, this is in direct disagreement with the needs of the CALD participants sampled in this study who rely on pictures and diagrams in place of text due to English literacy problems. Further, at least 80% of Kramer et al.'s (2015) population had at least a tertiary level education.

The results of these focus groups support the suggestions made by Klinich et al. (2010), Kramer et al. (2015) and Rudin-Brown et al. (2004) that instructions and labels can and need to be improved to address consumer needs. This is interesting because the different populations of users across the Canada, North America, and Australian studies are converging on best-practice recommendations for instructions and labels. Across all three studies, there has been sampling of high and low education, literacy, income, and experience. The focus groups conducted here now provide consumer-centred recommendations from culturally and linguistically diverse child restraint users.

While understanding that focus groups are snapshots of user behaviour and not a complete picture of consumer needs, we are now well placed to use the results here and in past literature to draft a prototype of new instructions, labels, and videos to increase the correct use of restraints.

Both Rudin-Brown et al. (2004) and Klinich et al. (2010) found significant increases in user satisfaction and preference for re-designed materials, but only limited success at increasing actual correct restraint use compared to current products. And while Kramer et al. (2010) was able to significantly increase percentage of correct installations, more than 60% of all installations were still incorrect. To ensure that errors in use are reduced in new prototype information, the next stage of the project will focus on iterative prototype design involving consumer-testing until at least 90% of all participants in a testing cycle are able to install and use the prototype without significant error (guidelines developed by Sless and Wiseman, 1997).

Limitations

The results outlined in this paper are preliminary. Saturation of themes related to how information is currently communicated was not reached in this small number of diverse focus groups. However, the data generated will be extremely useful input into the first stage of the prototype material design. The next step is to consult the focus group data to explore motivational and emotional factors relating to correct child restraint use.

Socio-economic Index for Areas was used as a proxy for education and income for sampling purposes. While it is not as important to look at the distribution of recommendations from participants based on their demographics in this first round of user-input, the next stage of this project requires more and complete demographic data and assurance that all key child restraint users are being captured by sampling strategies. Homogenous groups were chosen to increase participation's comfort with expressing opinions. However, this meant that groups were selected by researchers based on demographic information. The next stage of this project will use randomisation to allocate participants to user-testing cycles so that diversity of needs is addressed.

Conclusion

The qualitative results in this study have extended previous research efforts to improve instruction manuals and labels for child restraint products. Guidance from child restraint users from diverse backgrounds is necessary to ensure that consumers' needs are driving the direction of design, and focusing attention on the key factors for change at the outset of re-design. We have elicited 11 key recommendations from users that will be applied to re-design new prototype instruction manuals, labels, and videos. Through iterative design and user-testing, this project as a whole will result in new product information that is designed according to user needs, and effective at reducing errors in child restraint use. Eventually, the products will be tested in a laboratory trial against current materials in Australia.

Acknowledgements

This work is being funded by the NSW Centre for Road Safety. Child restraint systems and existing informative materials were supplied by Britax Australia, and Infa-Secure Pty Ltd. Julie Brown, Lynne Bilston and Kirsten McCaffery are supported by NHMRC fellowships. Alex Hall is supported by an Australian Postgraduate Award and NeuRA PhD top up scholarship. Kate Hunter is supported by a Poche Centre for Indigenous Health Post-doctoral fellowship.

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