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Buckle-Up Safely (Shoalhaven): a process and impact evaluation of a pragmatic multifaceted preschool based pilot program to increase correct use of age appropriate child restraints

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Abstract

Objective: To conduct a process and impact evaluation of a multifaceted education-based pilot program targeting correct use of age-appropriate restraints in a regional setting with a high proportion of Aboriginal and Torres Strait Islander families.

Methods: The program was delivered in 2010 in 3 early learning centers where 31 percent of the children were of Aboriginal and Torres Strait Islander descent. Each component of the program was assessed for message consistency and uptake. To measure program effectiveness, participating children were matched 1:1 by age, language spoken at home, and annual household income with 71 children from the control arm of a contemporaneous trial. The outcome measure in the control and program centers (a 4-category ordinal scale of restraint use) was compared using ordinal logistic regression accounting for age of the parent.

Results: Process evaluation found that though program components were delivered with a consistency of message, uptake was affected by turnover of all staff at one center and by parents experiencing difficulty in paying for subsidized restraints at each of the centers. Impact evaluation found that children from the centers receiving the program had nearly twice the odds of being in a better restraint category than children matched from the control group (adjusted odds ratio [OR_{adj}] = 2.06, 95% confidence interval [CI], 1.09-3.90).

Conclusions: This was a pragmatic study reflecting the real-life issues of implementing a program in preschools where 57 percent of families had a low income and turnover of staff was high. Despite these issues, impact evaluation showed that the integrated educational program showed promise in increasing correct use of age-appropriate restraints. The findings from this pilot study support the use of an integrated educational program that includes access to subsidized restraints to promote best practice child restraint use among communities that include a high proportion of Aboriginal and Torres Strait Islander families in New South Wales. Future trials in similar settings should consider offering more support in centers with high turnover of staff and offering alternative methods of payment when families experience financial difficulties in purchasing the subsidized restraints. If proven in larger trials, this approach could reduce death and injuries in child passengers in this vulnerable group.

Keywords

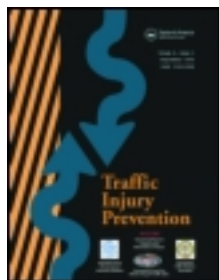
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Buckle-Up Safely (Shoalhaven): a process and impact evaluation of a pragmatic, multifaceted preschool based pilot program to increase correct use of age appropriate child restraints.

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Abstract

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Results: Process evaluation found that while program components were delivered with a consistency of message, uptake was affected by turnover of all staff at one center and by parents experiencing difficulty to pay for subsidised restraints at each of the centers. Impact evaluation found that children from the centers receiving the program had nearly twice the odds of being in a better restraint category than children matched from the control group ($OR_{adj}=2.06$, 95% CI: 1.09-3.90).

Conclusions: This was a pragmatic study reflecting the real-life issues of implementing a program in preschools where 57% of families had a low income and turnover of staff was high. Despite these issues, impact evaluation showed that the integrated educational program showed promise in increasing correct use of age appropriate restraint. The findings from this pilot study support the use of an integrated educational program that includes access to subsidised restraints to promote best practice child restraint use among communities that include a high proportion of Aboriginal and Torres Strait Islander families in New South Wales. Future trials in similar settings should consider offering more support in centers with high turnover of staff and offering alternative methods of payment when families experience financial difficulties in purchasing the subsidised restraints. If proven in larger trials, this approach could reduce death and injuries in child passengers in this vulnerable group.

Key words: booster seats, car restraints, programs, evaluations.

Preliminary findings were presented at the National Conference on Injury Prevention, Brisbane, November 2-4, 2011.

INTRODUCTION

Aboriginal and Torres Strait Islander people account for approximately 2.5% of the Australian population (Australian Bureau of Statistics 2010) and are 2.7 times more likely than other Australians to die from road related injury (Henley et al. 2010). Passengers account for 56% of these fatalities (Henley et al. 2010). More specifically, Aboriginal and Torres Strait Islander males aged 0-4 years are 6 times, and females 3 times, more likely to die from road related injury than other Australian children of the same age (Henley et al. 2010).

The association between restraint use and injury reduction is well documented. The correct use of age appropriate restraint is associated with reductions in risk of death (Du et al. 2008), and serious injury (Brown et al. 2006). In March 2010, legislation was introduced in New South Wales (NSW) that aligned with the National Road Rules Amendment Package 7 (2007) mandating that all children aged up to 6 months travel in a rear facing restraint, children from 6 months up to 4 years travel in an approved forward facing or rear facing restraint, and children aged 4 to 7 years be in an approved forward facing restraint or booster seat (New South Wales Government). Correct use of age appropriate restraints is low in Indigenous communities in Australia (Helps et al. October, 2008), the United States of America (Lapidus et al. 2013; Lapidus et al. 2005) and New Zealand (Brewin et al. 2003; Simpson et al. 2006). The need to prioritise effective road injury prevention programs targeting Aboriginal and Torres Strait Islander people is acknowledged (Clapham et al. 2008) yet few publications present outcome evaluations to inform future planning. While some Australian initiatives address general

road safety knowledge as seen in the Safe Koori Kids initiative (Clapham et al. 2010) or the provision of safer travel options such as school bus pickup relocation in the Cherbourg Injury Prevention and Safety Promotion program (Eley et al. 2011), there are no evaluated Australian initiatives directly targeting increases in correct use of age appropriate restraints among Aboriginal families.

Multifaceted education based programs (Ehiri et al. 2006) including child safety seat classes for parents (Apsler et al. 2003; Brixey et al. 2009; Istre et al. 2002; Istre et al. 2011), hands-on demonstrations (Istre et al. 2002; Istre et al. 2011), child restraint fitting checks (Istre et al. 2011), or free or subsidised restraints (Apsler et al. 2003; Brixey et al. 2009; Istre et al. 2002; Istre et al. 2011) have been shown to positively affect age appropriate restraint use (Apsler et al. 2003; Brixey et al. 2009; Istre et al. 2002) but none of these activities have been trialled in communities with a large proportion of Aboriginal families. Furthermore one study trialled a multi-faceted approach yet did not find a positive outcome. The authors suggested high staff and child turnover at the centers may have led to parents receiving inconsistent and infrequent child restraint messages leading to attenuation of intervention effects (Thoreson et al. 2009).

A multifaceted education program, targeting correct use of age appropriate restraints, was developed, implemented and evaluated using a cluster randomised controlled trial design in a low socio-economic population in South West Sydney (Ivers et al. 2011). The aim of this pilot study is to test the effectiveness of that multifaceted program in a regional community with a large proportion of Aboriginal families.

METHODS

We invited three early learning centers in Shoalhaven to participate in this pilot study and receive the Buckle-Up Safely program (Hunter et al. 2010). All three centers approached agreed to participate. Centers were selected based on the number of children attending the center (more than 20 children aged between 3-5 years), sufficient physical access to allow for safe observation of child restraint use, and at least 20% of the families enrolled at the centers were of Aboriginal origin.

The Buckle-Up Safely Program

The Buckle-Up Safely program was delivered to the three centers in 2010. It is an integrated education based program and its key elements are described elsewhere in detail (Hunter K et al. 2011; Ivers et al. 2011). The Buckle-Up Safely program was guided by the Precaution Adoption Process Model (PAPM) (Weinstein 1988; Weinstein et al. 1992) which had been used previously as the theoretical framework for behaviour change in a parents' child safety behaviour program that included a child restraint component (Gielen et al. 2007). In this theoretical model, behaviour change is viewed as a staged process. At first a person is unaware of the issue (Stage 1), then becomes aware of the issue but has not considered any precautionary actions (Stage 2). He/she then considers the precautionary behaviour but has not taken any action, so is engaged but undecided to act (Stage 3), once engaged a decision process occurs that leads to a decision either to not adopt the behaviour (Stage 4), or to adopt the behaviour (Stage 5). Finally, the behaviour is adopted (Stage 6) and then maintained (Stage 7). The Buckle-Up Safely program was implemented July-November and its components were aimed at helping people move through the stages of behaviour change. (Figure 1

summarises the program components in the context of the stages of behaviour change.) Essentially, the program involved: a 2-hour educators' professional development program and ongoing support, delivery of 'hands-on' parent information sessions (1 at each center), giving parents a Buckle-Up Safely bag containing resources (DVD, Question and Answer sheets and information 'postcards'), access to a subsidised restraint distribution (15 seats available at the 2 larger centers and 10 at the smaller center) and for those who took up the subsidised restraints, access to an authorised child restraint fitting station with mechanics who, familiar with the key program messages, distributed and fitted the subsidised restraints. The educators' professional development included (i) background information highlighting the safety benefits of using age appropriate child restraints and using them correctly; (ii) a DVD summarising the information; and (iii) resources to help educators bring the use of child restraints into their daily educational program with the children. All center directors were offered the opportunity for support in developing a safe arrival and departure policy.

Comparison Group

The children in the comparison group were from centers which were designated as control centers in the contemporaneous Sydney study (Ivers et al. 2011). These control centers were randomly selected from a 2009 database of all preschools and child care centers operating within Statistical Local Areas of West and South-Western Sydney with a Socio-Economic Index For Areas (SEIFA) in the lower 30% of metropolitan Sydney (SEIFA <1010) (Australian Bureau of Statistics 2006; Ivers et al. 2011). Children in the group receiving the Buckle-Up Safely program in the current study were matched 1:1

with children from those control centers. Children were matched for factors known to influence restraint use: age of the child, language spoken at home and annual household income (Bilston et al. 2011). Children in the control centers received their usual educational program, typically developed by center staff at each service. Figure 2 presents a flow of the participants for the observational analysis and exposure to the various components of the Buckle-Up Safely program.

Program Fidelity

Each component of the program was assessed for its consistency of message, use of resources and parent / carer's potential exposure to the program. The professional development seminar and education program were assessed by the proportion of center educators who attended the professional development session, observation of the professional development session (to identify any deviations from the session plan), evidence of uptake of learning experiences for the children, proportion of education staff who remained at the center two months from the professional development date, and number of centers that implemented changes to their safe arrival and departure policies to include the use of age appropriate restraints. The parent information session was assessed by the proportion of families represented at the parent information sessions, and observation of the parent information session (to identify any deviation from the session plan). The subsidised restraint distribution program was assessed by the number of subsidised restraints sold (and proportion of families who bought these), and number of restraints collected **before** the start of the observation period.

Program Effectiveness

To measure program effectiveness we conducted a controlled analysis of observed restraint use by comparing observed restraint use between children in the Shoalhaven and children in the control centers from the contemporaneous cluster randomised controlled trial, and conducted a pre- post-survey based on self-reported restraint use and readiness to use age appropriate restraints before and after the program within the Shoalhaven group.

Observed restraint use: Restraint use was measured by observing how the child was seated in the restraint and how the restraint was installed in the car on arrival at the center. Observations were conducted between 8 and 11 weeks after the parent information session. All families arriving at the centers in the mornings were invited to participate, and to eliminate potential clustering effects one child aged between 3-5 years per vehicle was selected. Families were given no prior warning that the observers would be present and therefore had no opportunity to change the way their child was buckled in the restraint before the observation began. The detailed examination of the restraint installation was conducted once the child had left the vehicle. If there were more than one child in that age group in the car then the child with the nearest birthday was selected. Observed restraint use was only measured after the program had been implemented to avoid the observation process influencing behaviour. The data collection process was the same as used in the control centers. In alignment with that process we closed recruitment when the target of 20 observations was reached or 70% of eligible children at that center or within 2 weeks of observations (Keay et al. 2012).

As with the parallel study, we limited the duration of observations at each center as the presence of observers over a long period could lead to people changing how they would normally travel with their children. Trained observers, who had participated in cultural competence training specifically for this study, were the same observers as those in Sydney.

Self reported restraint use before and after the program: Before and after the program locally trained Aboriginal and non-Aboriginal interviewers invited all parents and carers of children aged 3-5 years enrolled at the Shoalhaven centers to participate in surveys. Before the program, interviews were conducted at both morning drop-off and afternoon pick-up, while post-program interviews were during the observation process described above. Once the observation period had ended, interviews at the centers continued for an additional week to optimise the follow-up rate for the before and after comparisons of self-reported restraint use. Interviews were conducted outside the car. Interview questions were adapted from previous research (Bilston et al. 2008) and had additional questions about current child restraint legislation and Indigenous status. Parents were shown pictures of different restraints (rear facing, forward facing, booster seat and a car seat with only the seatbelt) and asked to identify how their child had travelled to the center that day. An interviewer administered the survey, except the demographic questions which parents were invited to complete themselves. A unique identifier was allocated to each pre-program survey and then linked to the post-program survey.

Outcome definitions: Restraint types were described according to restraint type definitions given in AS/NZS 1754 (Standards Australia et al. 2010). Age appropriate restraint use was defined as rear facing or forward facing restraint for 2-3 year olds and forward facing or booster seats for 4-5 year olds. Correct use was defined as the restraint being used as stated by manufacturers' instructions and included both how the child used the restraint and how the restraint was installed in the vehicle. Two or more minor errors (for example, a small amount of slack in the harness) or one major error (such as a large amount of slack in the tether or wearing the harness under the arm) was coded as a significant error and only one minor error or no errors were coded as no significant errors. Optimal restraint use combines both age appropriate restraint and correct use. This combined measure had four categories: 'Optimal' (1) (age-appropriate restraint and no significant errors,) 'Sub-optimal' (2)(not age-appropriate but no significant errors) and significant errors with (3) and without (4) an age-appropriate restraint (Keay et al. 2012).

Analysis

As no data were available on restraint use among Aboriginal preschoolers we estimated that a sample size of 60 would be able to detect an increase in age appropriate restraint use of 31% to 36% with 80% power and 5% statistical significance, assuming a baseline rate of 10 – 40%.

The combined restraint use measure was used as an ordinal outcome variable. The validity of this variable as an ordinal measure was confirmed by testing the proportional odds assumption. The outcome measure in the program and control groups was then

compared using ordinal logistic regression. In the regression analysis we accounted for matching by using the clustered sandwich estimator and we examined the effects of age of the parent (aged 35 years or younger) and number of children in the family (two or more children) as these were previously found to be associated with restraint use (Cunningham et al. 2011; Keay et al. 2013) but were not part of the matching process.

Before and after self reported restraint use and stages of behaviour change: We assessed the stages of behaviour change using a matrix adapted from that used by Gielen et al. (2007) and allocated the participant to a particular stage based on their response to standard questions. The score for best possible behaviour reflected that the restraint being used was age appropriate, used every time the child was in the car and had been checked by an authorised fitter. Similar to Gielen et al. (2007) we dichotomised behaviour profile responses to the best restraint behaviour profile versus all others and compared proportions of these binary variables before and after the program using McNemar's test. Analyses were conducted in SAS 9.2 or Stata 12.

Ethics approval

We presented the proposed research to the local Aboriginal Education Consultative Group and received their verbal support. An Advisory Committee with Aboriginal and local community representation was established to guide and advise program implementation and the evaluation process. The research was approved by both the University of Sydney Ethics Committee and the Aboriginal Health and Medical Research Council of NSW Ethics Committee.

RESULTS

Program fidelity

The program start date was the educators' professional development session (July 12) and program completion was the final purchase of the subsidised restraints (November 5). The parent information sessions were September 16 (two centers) and 23 (one center). The children's restraint education program ran from July 12 to mid September with varying levels of implementation. One Road Safety Child Education expert conducted the educators' professional development session as well as all the parent information sessions and the observer reported that all sessions kept to the session plans. All centers were represented at the professional development workshop which seven of the 13 educators (54%) attended. However, one center then experienced a complete turnover of staff. Table 1 presents a summary of the key program fidelity measures.

A total of 24 parents attended the 'hands-on' parent information sessions across the centers and 39 subsidised restraints were purchased. Of the 134 families with children turning 3-5 years in 2010 enrolled at the centers, 97 parents and carers (72%) completed the baseline survey. Of those children, 30 (31%) were reported to be of Aboriginal or Torres Strait Islander descent and 57% of families reported an annual household income of less than \$60,000 (Table 2).

Increased Correct Use Of Age Appropriate Restraints Compared With Matched Controls

Over the observation period, in Shoalhaven we approached 213 vehicles. Of those, 59 had already participated, 43 were ineligible (12 did not have children in the car, 18 did

not have children in the 3-5 year age range, 11 were staff members and 2 were community buses). From the remaining 111 vehicles, 73 people agreed to participate. Participants did not vary from nonparticipants in terms of a preschool child travelling in the front seat (6 of 73 participants; 8% versus 2 of 38 nonparticipants; 5%; $p=0.33$) or preschool children being restrained in child car restraints (66 of 73; 90% versus 32 of 36; 89%; $p=0.80$). Participants were slightly more likely to have all children in the car restrained (72 of 76; 99% versus 34 of 38; 90%; $p=0.07$) and the driver of the vehicle being female (59 of 73 participants; 81% versus 24 of 38 of nonparticipants 63%; $p=0.07$), but these differences were not statistically significant. Comparisons of participants and non-participants in the contemporaneous cluster RCT reported similar findings (Keay, et al. 2012). Not all children travelled singly by car to their center. There were some instances where some families had car-pooled and Center Two had a community bus that was used by 8 families. Furthermore, at Centers One and Three a number of children walked each day to the center, though the number of children arriving on foot and the number of families who had car-pooled were not recorded.

After the program, restraint use was observed for 73 families in the Shoalhaven centers but due to one child being younger than 3 years from one family and another with missing data final analyses were conducted for 71 families in the Shoalhaven and 71 matched families in the control group. Few children were optimally restrained: 39% of children from the Shoalhaven were optimally restrained and 31% from the control group. After controlling for whether the interviewed parent was aged 35 years or younger, the children from the Shoalhaven had 2.06 times the odds of being in a better category of

the four-point ordinal scale than children from the control group (95% CI: 1.09 – 3.90) (Table 3). Parents aged 35 years or younger had 3.29 times the odds of being in a better restraint category (95% CI: 1.51-7.17). The number of children in the family was not significant ($P=0.45$) and so was dropped from the final regression model.

Changes In Self-Reported Restraint Use And Intention To Adopt Appropriate Restraint Use

After the program, interviews were completed for 69 of the 97 children (follow-up rate 71%). Of the 28 children lost to follow-up, 13 no longer attended the center. Lack of time was the most common reason cited by parents for not participating in the interviews and observations. Among these 69, self-reported use of an appropriate restraint for age was not significantly different before and after the program (87% versus 86% respectively; $\chi^2_1 = 0.07$, $P=0.79$). When analysing the behaviours according to the PAPM profiles, more families were in the highest restraint behaviour profile after the program (increasing from 25% to 32%) but this change was not statistically significant ($\chi^2_1 = 1.47$, $P=0.22$).

DISCUSSION

We conducted a pilot study, including a process and impact evaluation, of a multifaceted education based program targeting correct use of age appropriate restraints in a community with a large proportion of Aboriginal families. Although we were not able to conduct a formal randomised trial, this study showed that the Buckle-Up Safely program consisting of education combined with hands-on demonstrations,

access to subsidised restraints and restraint checks performed by an authorised restraint fitter may increase optimal restraint use among children attending preschools and long day care centers in the Shoalhaven region.

This was a pragmatic study. Our process evaluation found that while there was consistency of message across the centers program uptake reflected the reality of implementing a program in early childhood centers in a regional setting where more than half the families (57%) had a low household income (Centerlink 2010). Although we sought to make the subsidised restraints affordable to families, center directors reported that families' economic hardship delayed the uptake and therefore, delivery and fitting of the subsidised restraints. Of the 39 subsidised restraints purchased during the program 31% had not been collected (nor professionally fitted) before the start of final data collection. We could not delay the data collection as the entire program had to be conducted within the school year to avoid loss of preschool children when they graduate to school; a longer timeframe may have increased the effect in this setting. The interest parents had in the subsidised restraints and the difficulty some parents experienced in purchasing the restraints highlight the need to have affordable restraints made available to low income families.

In the impact evaluation we found parental age was a significant predictor of correct use of age appropriate restraint. The finding that parents aged 35 years and younger had almost 3 times the odds of their children being in a better category for restraint use is the opposite from previous findings where younger parents were found to be associated

with less optimal restraint use (Keay et al. 2011; Keay et al. 2013) and is worth exploring in future studies involving regional centers.

We found no significant difference in self-reported restraint use or stages of behaviour change though the proportion in the optimal category increased (27% before compared with 32% after) for stages of behaviour change. In this instance more parents reported that they had their child in an age appropriate restraint and the restraint had been professionally fitted. It is possible that response shift bias was involved as parents knew that their child's restraint use was being directly observed when the post-implementation interview was taking place and this may have influenced their self-reported restraint behaviour. Thus it is possible there was some over-reporting of age appropriate restraint use before the program and less biased reporting after the program, resulting in a null finding. Finally, the higher than expected self reported baseline (87%) meant that the study was insufficiently powered to detect a small self-reported change.

In 2009, Thoreson et al. reported no significant change in booster seat use following a combined educational and booster seat distribution program and posited that the high turnover of staff in the child care centers may have affected the consistency of messages to parents (Thoreson et al. 2009). Similarly in our pilot study, the fidelity of the program implementation was adversely affected by the turnover of all staff at one center. The Buckle-Up Safely program relied heavily on the teachers at each center to run learning experiences for the children, promote the parent information session and administer the purchase of subsidised restraints. Only two programming suggestions were taken up by that center despite new and temporary staff being supportive of the

program. This led to limited promotion of the parent information session and delayed uptake of the subsidised restraints at that center.

While the early childhood centers in this pilot were not servicing Aboriginal communities alone, the proportion of children of Aboriginal and Torres Strait Islander descent attending the centers was 31%, markedly higher than the 2.5% for the Australian population as a whole (Australian Bureau of Statistics 2010). Our results are aligned with those from multifaceted programs targeting restraint use and incorporating education of parents and access to subsidised (or loaned)(Istre et al. 2002) restraints implemented in low income communities (Apsler et al. 2003), Hispanic (Istre et al. 2002), American Indian and Alaskan Native communities in the United States (Letourneau et al. 2008) and Maori communities in New Zealand (Brewin et al. 2004).

The research team worked closely with the local community to ensure the conduct of the study adhered to recommended guidelines for researchers to work effectively and appropriately with Aboriginal and Torres Strait Islander communities (Aboriginal Health & Medical Research Council of New South Wales (AH&MRC) Ethics Committee 2009; Aboriginal Services Branch 2009; Australian Government ; Jamieson et al. 2012; Martinuik et al. 2010). First, we worked with an advisory committee comprising local representatives and researchers who are of Aboriginal and Torres Strait Islander descent to advise on the overall conduct of the research. Second, we trained local people and employed them to conduct the interviews with parents and carers. Finally, results of this study were shared with both the participating centers and the local Aboriginal Education Consultative Group. We believe this program was well accepted

by the community as we have received requests from both center staff and parents for the program and its resources to be shared with other childcare centers and playgroups in the area.

Other than access to subsidised restraints, this program is based upon the integration of existing resources and services such as the *Kids & Traffic* Early Childhood Road Safety Education Program, Macquarie University, which is funded by the NSW Centre for Road Safety and is part of its road safety education program, as well as services from authorised restraint fitters and information pamphlets highlighting the child restraint legislation developed by the NSW Roads and Maritime Services so it is possible for the Buckle-Up Safely program to be sustained with commitment from policy makers beyond the life of the study.

There are some limitations that should be kept in mind and readers are advised to be cautious when interpreting the findings from the impact evaluation. The small numbers in this pilot study (71 matched pairs from 3 early childhood centers in the Shoalhaven and 14 early childhood centers in the Sydney controls), resulting in the wide confidence intervals, did not allow the analysis to take into account clustering by center or the effect of Aboriginal or Torres Strait Islander descent. Only 1.4% of parents in the matched control group said they were of Aboriginal or Torres Strait Islander origin compared with 19.7% of parents from Shoalhaven (31% of children), so we were unable to match parents by Aboriginal status. The program was implemented in preschools and a long day care center in regional NSW. It is possible that the results would be different in more remote or more urban settings or in settings other than early education centers.

This may affect the generalisability of the results. In addition, as there was no random assignment and exposure to the program was low and uneven across centers, it is possible that the observed change in restraint use was associated with factors other than the Buckle-Up Safely program. Should a larger trial of a similar program be implemented, we advise researchers to consider key findings from the process evaluation, notably, to ensure ongoing support to the centers to offset changes in staff, and to explore alternative methods of purchasing subsidised restraints to address financial barriers experienced by some families. Furthermore, when a Steering Committee is being established the opportunity for representation of parents from each center could be considered to aid program implementation and uptake.

Conclusions

The Australian government is committed to addressing the health disparities between Indigenous and non-Indigenous Australians and our multifaceted education based program cuts across two of the seven building blocks of the Close the Gap initiative: safe communities and early childhood. We have taken a mainstream multifaceted program and shown it has promise in improving child restraint practices in a regional environment with a large proportion of Aboriginal and Torres Strait Islander families, who have not previously been well represented in child restraint intervention studies.

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REFERENCES

Aboriginal Health & Medical Research Council of New South Wales (AH&MRC) Ethics Committee. AH&MRC Guidelines for research into Aboriginal health: key principles. Sydney, Australia; 2009.

Aboriginal Services Branch. Working with Aboriginal people and communities: a practice resource. Ashfield, Australia: NSW Department of Community Services; 2009.

Apsler R, Formica SW, Rosenthal AF, Robinson K. Increases in booster seat use among children of low income families and variation with age. *Inj Prev*. 2003 Dec;9(4):322-25.

Australian Bureau of Statistics. 2033.0.55.001 Census of population and housing: Socio-Economic Indexes for Areas (SEIFA) Data only. 2006. Available at: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/2033.0.55.001/>. Accessed October, 2009.

Australian Bureau of Statistics. 4704.0 - The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples 2010. Available at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/lookup/4704.0Chapter210Oct+2010>.

Accessed February 18, 2013.

Australian Government. Closing the Gap. Available at: <http://www.fahcsia.gov.au/our-responsibilities/indigenous-australians/programs-services/closing-the-gap/closing-the-gap-targets-and-building-blocks>. Accessed February 13, 2013.

Bilston LE, Du W, Brown J. Factors predicting incorrect use of restraints by children travelling in cars: a cluster randomised observational study. *Inj Prev*. 2011 Apr;17(2):91-96.

Bilston LE, Finch C, Hatfield J, Brown J. Age-specific parental knowledge of restraint transitions influences appropriateness of child occupant restraint use. *Inj Prev*. 2008 Jun;14(3):159-63.

Brewin M, Coggan C. Evaluation of the Ngati Porou community injury prevention project. *Ethn Health*. 2004;9(1):5-15.

Brewin M, Peters T. An investigation of child restraint/seatbelt usage in motor vehicles by Maori in Northland New Zealand. *Inj Prev*. 2003 Mar;9(1):85-86.

Brixey S, Guse CE, Ngui E. Free child passenger restraints for patients in an urban pediatric medical home: effects on caregiver behavior. *WMJ*. 2009 Oct;108(7):352-58.

Brown J, McCaskill ME, Henderson M, Bilston LE. Serious injury is associated with suboptimal restraint use in child motor vehicle occupants. *J Paediatr Child Health*. 2006 Jun;42(6):345-49.

Centrelink. A Guide to Australian Government Payments Canberra, Australia: Australian Federal Government. 2010. Available at: [http://www.centrelink.gov.au/internet/internet.nsf/filestores/co029_1009/\\$file/co029_1009en.pdf](http://www.centrelink.gov.au/internet/internet.nsf/filestores/co029_1009/$file/co029_1009en.pdf). Accessed February 6, 2012.

Clapham K, Khavarpour F, Bolt R, Stevenson M. Child injury in an urban Australian indigenous community: the safe koori kids intervention. *Inj Prev*. 2010;16(Suppl 1):A138.

Clapham K, Senserrick T, Ivers R, Lyford M, Stevenson M. Understanding the extent and impact of Indigenous road trauma. *Injury*. 2008;39:S19-S23.

Cunningham CE, Bruce BS, Snowdon AW, Chen Y, Kolga C, Piotrowski C, Warda L, Correale H, Clark E, Barwick M. Modeling Improvements in booster seat use: a discrete choice conjoint experiment. *Accid Anal Prev*. 2011; 43(6):1999-2009.

Du W, Hayen A, Bilston L, Hatfield J, Finch C, Brown J. Association between different restraint use and rear-seated child passenger fatalities: a matched cohort study. *Arch Pediatr Adolesc Med*. 2008 Nov;162(11):1085-89.

Ehiri JE, Ejere HO, Magnussen L, Emusu D, King W, Osberg JS. Interventions for promoting booster seat use in four to eight year olds traveling in motor vehicles. *Cochrane Database Syst Rev*. 2006; Issue 1. Art. No.: CD004334. DOI:10.1002/14651858.CD004334.pub2

Eley R, Beckett A, Henshaw R, Gorman D, Evans M, Carswell C. Injury prevention and safety promotion in the Aboriginal community of Cherbourg. In: Gregory G, editor. Proceedings of the 11th National Rural Health Conference. Perth WA: National Rural Health Alliance; 2011

Gielen AC, McKenzie LB, McDonald EM, Shields WC, Wang MC, Cheng YJ, Weaver NL, Walker AR. Using a computer kiosk to promote child safety: results of a randomized, controlled trial in an urban pediatric emergency department. *Pediatrics*. 2007;120(2):330-39.

Gunn VL, Phillippi RM, Cooper WO. Racial differences in child safety restraint use in Tennessee. *Inj Prev*. 2005 Dec;11(6):340-42.

Helps YLM, Moller J, Kowanko I, Harrison J, O'Donnell K, de Crespigny C. Aboriginal people travelling well: issues of safety, transport and health. Canberra, Australia: Department of Infrastructure, Transport, Regional Development and Local Government; October, 2008.

Henley G, Harrison J. Injury of Aboriginal and Torres Strait Islander people due to transport, 2003-04 to 2007-08. Injury research and statistics series no. 58 Cat. no. INJCAT 134. Canberra, Australia: Australian Institute of Health and Welfare; 2010.

Hunter K, Keay L, Brown J, Bilston L, Fegan M, Cosgrove L, Simpson JM, Elliott M, Thistlethwaite K, Ivers R. A multifaceted program to increase the appropriate use and decrease the misuse of child restraints. Paper presented at: Australasian Road Safety, Research, Policing and Education Conference; November 6-9, 2011; Perth, Australia.

Hunter K, Clapham K, Lyford M, Keay L, Brown J, Bilston L, Fegan M, Ivers R. Buckle up safely for Indigenous children. Paper presented at: Australasian Road Safety, Research, Policing and Education Conference August 31 - September 3, 2010; Canberra, Australia.

Istre GR, McCoy MA, Womack KN, Fanning L, Dekat L, Stowe M. Increasing the use of child restraints in motor vehicles in a Hispanic neighborhood. *Am J Public Health*. 2002 Jul;92(7):1096-99.

Istre GR, Stowe M, McCoy MA, Moore BJ, Culica D, Womack KN, Anderson RJ. A controlled evaluation of the WHO Safe Communities model approach to injury prevention: increasing child restraint use in motor vehicles. *Inj Prev*. 2011 Feb;17(1):3-8.

- Ivers RQ, Keay L, Brown J, Bilston LE, Hunter K, Simpson JM, Stevenson M. Buckle up safely: a cluster randomised trial to evaluate the effectiveness of a pre-school based program to increase appropriate use of child restraints. *BMC Public Health*. 2011;11:16.
- Jamieson LM, Paradies YC, Eades S, Chong A, Maple-Brown L, Morris P, Bailie R, Cass A, Roberts-Thomson K, Brown A. Ten principles relevant to health research among Indigenous Australian populations. *Med J Aust*. 2012;197(1):16-18.
- Keay L, Hunter K, Bilston L, Simpson J, Elliott M, Thistlethwaite K, Ivers R, Brown J. Direct observations of child restraint use to evaluate a preschool based education and restraint distribution program. Paper presented at: Australasian Road Safety, Policing and Education Conference; November 6-9, 2011; Perth, Australia.
- Keay L, Hunter K, Brown J, Bilston LE, Simpson JM, Stevenson M, Ivers RQ. Child restraint use in low socio-economic areas of urban Sydney during transition to new legislation. *Accid Anal Prev*. 2013 Jan;50:984-91.
- Keay L, Hunter K, Brown J, Simpson JM, Bilston LE, Elliott M, Stevenson M, Ivers RQ. Evaluation of an education, restraint distribution, and fitting program to promote correct use of age-appropriate child restraints for children aged 3 to 5 years: a cluster randomized trial. *Am J Public Health*. 2012;102(12):e96-e102.
- Lapidus JA, Smith NH, Ebel BE, Romero FC. Restraint use among northwest American Indian children traveling in motor vehicles. *Am J Public Health*. 2005 Nov;95(11):1982-88.

Lapidus JA, Smith NH, Lutz T, Ebel BE. Trends and Correlates of Child Passenger Restraint Use in 6 Northwest Tribes: The Native Children Always Ride Safe (Native CARS) Project. *Am J Public Health*. 2013;103(2):355-61.

Letourneau RJ, Crump CE, Bowling JM, Kuklinski DM, Allen CW. Ride Safe: a child passenger safety program for American Indian/Alaska Native children. *Matern Child Health J*. 2008 Jul;12 Suppl 1:55-63.

Martinuik A, Ivers R, Senserrick T, Boufous S, Clapham C. Effective and inclusive intervention research with Aboriginal populations. Sydney: The Sax Institute; 2010.

New South Wales Government. Road Rules 2008. 2010. Available at: <http://www.legislation.nsw.gov.au/viewtop/inforce/subordleg+179+2008+fn+0+N>.

Accessed February 18, 2013.

Simpson JC, Turnbull BL, Stephenson SC, Davie GS. Correct and incorrect use of child restraints: results from an urban survey in New Zealand. *Int J Inj Contr Saf Promot*. 2006 Dec;13(4):260-63.

Standards Australia, Standards New Zealand. Child restraint systems for use in motor vehicles: Australian/New Zealand Standard (AS/NZS) 1754:2010. 2010

Thoreson S, Myers L, Goss C, DiGuseppi C. Effects of a booster seat education and distribution program in child care centers on child restraint use among children aged 4 to 8 years. *Arch Pediatr Adolesc Med*. 2009 Mar;163(3):261-67.

Weinstein ND. The precaution adoption process. *Health Psychol*. 1988;7(4):355-86.

Weinstein ND, Sandman PM. A model of the precaution adoption process: Evidence from home radon testing. *Health Psychol*. 1992;11(3):170-80.

Table 1: Buckle-Up Safely Program fidelity measures

	Center 1	Center 2	Center 3	Total
Number of families of enrolled children aged 3-5 years	35	24	75	134
Number of educators (staff)	3	3	7	13
Number and proportion (%) of staff turnover during the Buckle-Up Safely program implementation	1 (33)	3 (100)	0 (0)	4 (31)
Educators' professional development session				
Staff attendance	3	1	3	7
Evidence of uptake of learning experiences*	Moderate	Minimal	Moderate	
Evidence of restraint use reference in arrival, departure or excursion policies	Yes	Yes	Yes	
Parent information session attendance				
Number and proportion (%) of families of children aged 3-5 years**	9	2 (7)	13 (16)	24
Subsidised restraint program				
Number of restraints purchased and proportion (%) of families***	11 (31)	10 (25)	18 (17)	39 (24)
Number of purchased restraints and proportion (%) fitted before start of restraint use observation.	6 (55)	9 (90)	12 (67)	27 (69)

*Evidence of uptake of learning experiences was categorised into: None, Minimal (1-2 learning experiences including display of Buckle-Up Safely posters), Moderate (at least 3 learning experiences including display of posters), Strong (as for Moderate AND additional learning experience such as a learning corner or role play).

** Percentage of families can only be provided for Centers 2 and 3 as those centers only catered for children aged 3-5 years, Center 1 also catered for children 0-2 years. As this was a pragmatic study, we did not refuse entry to the parent information session for parents of children aged younger than 3 years; the invitation to participate in the parent information session was extended to all parents at the center.

***Six families purchased more than one restraint. The intended allocation of subsidised seats was 15, 10, 15 for Centers 1, 2 and 3 respectively. However, this was redistributed as families from

Center 1 were unable to meet the cost of restraints and more families from Center 3 expressed interest and were able to buy restraints.

Table 2: Characteristics of 97 children whose parents / carers participated in interviews before the program.*

	Center 1 n (%)	Center 2 n (%)	Center 3 n (%)	Total
Participating children	25	13	59	97
Child ages in years				
2	2(8)	0	0	2 (2)
3	11 (44)	5 (39)	17 (29)	33 (34)
4	7 (28)	2 (15)	37 (63)	46 (47)
5	5 (20)	6 (46)	5 (9)	16 (17)
Child is a male	10 (40)	8 (62)	31 (53)	49 (51)
Referent child of Aboriginal and/or Torres Strait Islander origin	9 (36)	10 (77)	11 (19)	30 (31)
Parent and family characteristics				
Number of children aged up to 18 years living in household, mean \pm standard deviation	2.5 \pm 1.5	3.1 \pm 1.4	2.4 \pm 1.1	2.5 \pm 1.3
Parent interviewed is aged ≤ 35 years	18 (72)	10 (77)	32 (54)	60 (62)
Completion of high school was parent's highest level of education	17 (68)	8 (62)	20 (34)	45 (46)
Household income \leq \$AU60,000 p.a. **	16 (76)	5 (63)	28 (49)	49 (57)

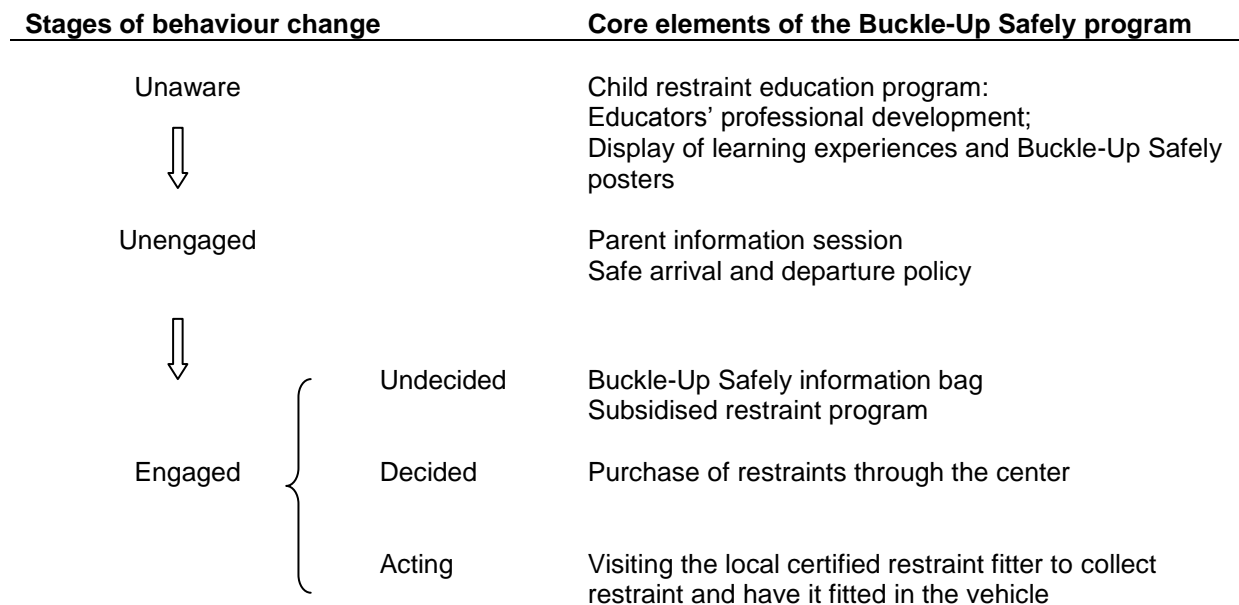
***Analyses for one child per respondent**

****11 parents did not provide information on household income, p.a.=per annum, \$AU=Australian dollars**

Table 3: Result of ordinal logistic regression of effect of the Buckle-Up Safely program on the combined measure of correct use of appropriate restraints.

	Shoalhaven No (%)	Control No (%)	Odds ratio for improvement in restraint use (95% CI)	P
No of centers	3	14		
Primary outcome (ordinal)				
Optimal restraint use (1)	28 (39)	22 (31)		
Inappropriate restraint, no errors in use (2)	13 (18)	13 (18)		
Appropriate restraint, errors in use (3)	28 (40)	29 (41)		
Inappropriate restraint, errors in use (4)	2 (3)	7 (10)		
Total children	71 (100)	71 (100)		
Shoalhaven (program)*			2.06 (1.09 – 3.90)	0.03
Parent aged ≤35 years			3.29 (1.51 – 7.17)	0.001

*Matched 1:1 for income, age of referent child and English speaking. Proportional odds assumption
P>0.05.



* Based upon the Precaution Adoption Process Model stages of behaviour change (Gielen et al. 2007)

Figure 1: The Buckle-Up Safely program core components grouped into the theoretical stages of behaviour change*.

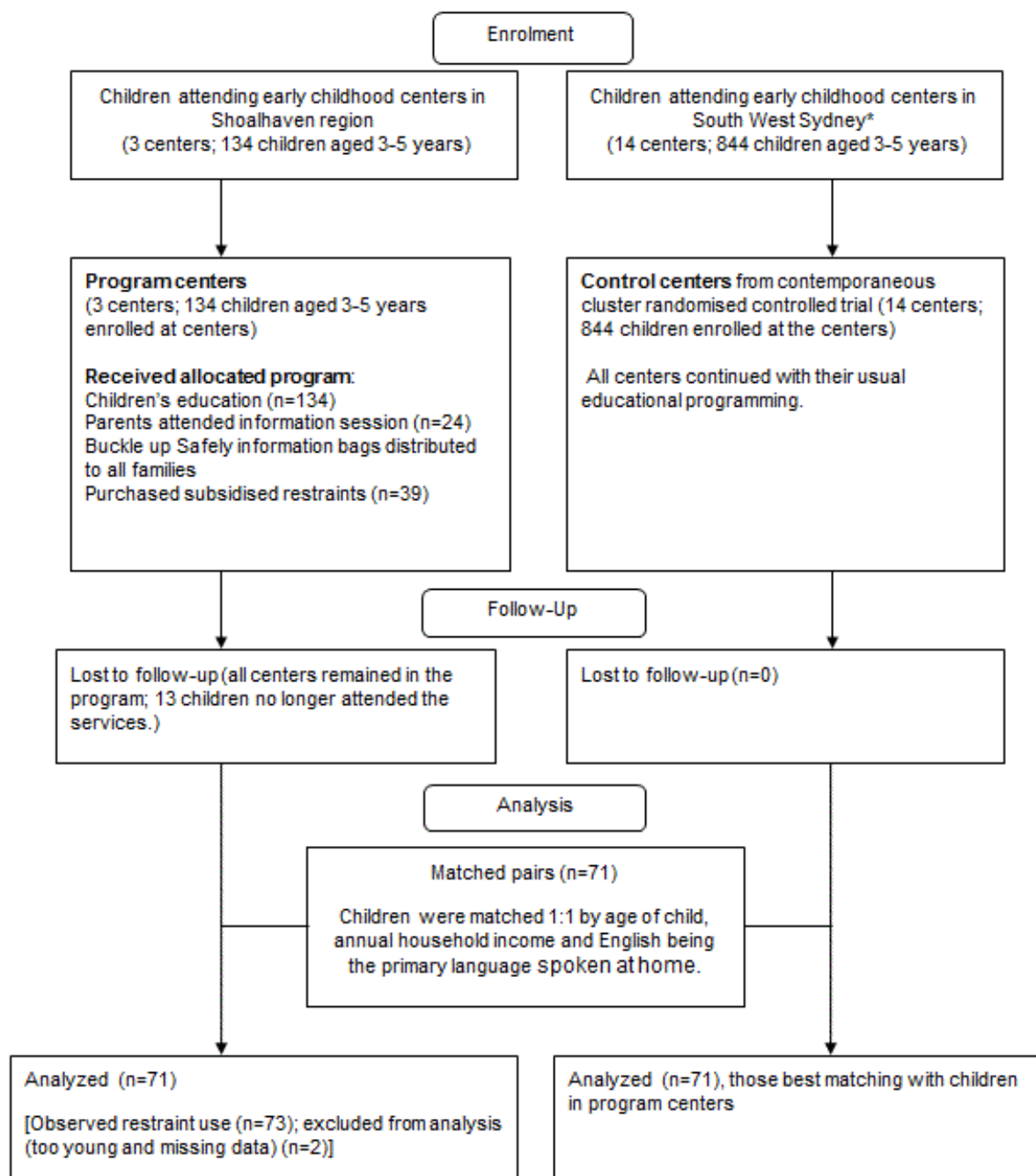


Figure 2: Flow of the participants for the observational analysis and exposure to the various components of the Buckle-Up Safely program.