

# **Star-Rating System for Pedestrian Walking Routes: A Pilot Study**

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## **ABSTRACT**

Childhood obesity is well recognised as a public health issue of significant community concern, with physical activity being a key factor in arresting obesity levels. The proportion of children walking to and from school has markedly decreased in the past few decades. Instead, parental concern regarding the overall safety of their children has increased. In light of this trend, the Star-Rating model was designed and developed as an assessment tool that provides a measure of safety, at varying crossing locations. The Star-Rating model takes into account the five main factors considered the most influential in determining the risk of both crash and injury to a pedestrian including: speed limit, traffic volume, road width, number of directions of conflicting traffic and type of crossing. With funding support from Victoria's Transport Accident Commission (TAC), the Star-Rating System for Pedestrian Walking Routes was a collaborative pilot study conducted by Caulfield Community Health Service (CCHS) in conjunction with Monash University Accident Research Centre (MUARC). The overall aim was to enhance pedestrian safety among primary school-aged children, while also promoting more active travel. Four local primary schools within the City of Glen Eira were engaged in the trial, with 97 ratings conducted by different rater-types from the community. Results in the pilot study found that those children, parents and various groups of professionals that took part in the trial were largely supportive of the Star-Rating concept and that the availability of such information would have the potential to influence their decision regarding their children walking to and from school. A secondary finding in the results was that an approximate average, two-star difference existed between objective and subjective ratings. This finding raised questions about the closeness of each rating type, relative to true ratings of risk. At present, a conclusion cannot be drawn regarding the difference identified. Further research is recommended to address additional trialling of the tool in a greater variety of settings, as well as population groups. Such findings can be used to help further develop and enhance the Star-Rating tool, which currently holds great promise for future implementation within health promotion initiatives surrounding physical activity, through addressing overall pedestrian safety.

## **AUTHOR BIOGRAPHIES**

### **Biography of Sara Liu**

*Qualifications: PostGradDip(Psych); GradDip(Psych); BBioMed.Sci*

Sara's area of expertise stems from a psychology background, looking particularly at the behavioural component, and its application to road safety research. Sara has experience in pedestrian, motorcycle, and driver safety research, examining the various behavioural factors that impact on reducing crash risk, as well as serious injuries and fatalities.

### **Biography of Dr. Bruce Corben**

*Qualifications: Ph.D. (Acc.Res.); M.Eng.Sc. (Trans); G.Sc. (Physics)*

Following 20 years as a road safety practitioner in the traffic engineering, management and design fields, Bruce's main research interests include improving the safety of pedestrians, roadsides and intersections, through infrastructure design, speed management and strategy development. His PhD explored opportunities for creating safe traffic environments for pedestrians.

### **Biography of Dr. David B Logan**

*Qualifications: Ph.D. (Mech.Eng.); BE (Hons, Mech.Eng.)*

David's current work involves road safety strategy modelling and implementation, innovative intersection design and pedestrian safety modelling. He managed the multidisciplinary real-world crash investigation team for nine years and has significant research expertise in this area. David also led the instrumented on-road vehicle program.

### **Biography of Dr. Jennie Oxley**

*Qualifications: Ph.D. (Psych); BSci(Hons)*

Jennie's main research expertise is in the field of human factors psychology, particularly the role of behavioural and functional factors on crash and injury risk, as well as the development of innovative measures to improve the safety and mobility of vulnerable road users. At present, Dr Oxley holds the position of Associate Director of MUARC Malaysia.

### **Biography of Kirstan Corben**

*Qualifications: M(Organisational Leadership); M(Health Promotion); BPhysio*

Kirstan has ten years of experience in the Australian community health sector spanning roles in health service management, population health and physiotherapy. Kirstan's work focuses on achieving physically active, socially connected and environmentally sustainable communities. In addition, Kirstan has led ongoing improvements in population health practice and smoke free environments.

### **Biography of Jacqueline Goy**

*Qualifications: BHealth.Sci.*

Jacqueline works within a health promotion role in a community health setting. Jacqueline is actively involved in planning, implementing and evaluating a broad range of health promotion initiatives and has a particular interest in active transport for children, environmental sustainability, community participation, social inclusion and capacity building.

## INTRODUCTION

Walking is the first and most fundamental means for humans to move. However, with the advent of motorised transport over the past century, its uptake, as a mode of transport has fallen dramatically. Indeed, among today's greatest global challenges are climate change, energy conservation and population health. In the Victorian context, physical inactivity and obesity among children have been identified as high priority concerns (Shilton & Naughton, 2001; Salmon, Breman, Fortheringham, Ball, & Finch, 2000). These challenges are due in large part to the rapid rise in motorised travel and the resultant decline in walking and cycling. There are many compelling reasons for affording walking a much higher priority than has occurred over the last half century.

In many parts of the developed world, there is growing concern about the physical and mental well-being of school-aged children who are reducing their number of trips to and from school on foot. Evidence from Australia indicates that only one in five children walk to school, despite strong evidence regarding the physical-psycho-social health benefits of regular physical activity (Timperio, Crawford, Telford & Salmon, 2004). One of the key factors influencing children's active travel behaviours are parents and carers who are becoming increasingly concerned about the safety and security of their children walking without the provision of safe crossing opportunities (Yeung, Wearing & Hills, 2008). As a result, many parents and carers prefer to drive children to and from school, to protect them from the heavy traffic conditions surrounding school areas.

Between 1974 and 2003, the proportion of students walking to school in Melbourne declined from 45% to 20%, while car travel to school increased from 25% to 70% (VicHealth, 2007). The resulting rise in traffic congestion around schools at pick-up and drop-off times has become a hazard in itself, and parents are reporting increasing concern regarding the volume and speed of cars around schools. Parental fears are, unfortunately, not unfounded, with 21% of Victorian fatal injuries in children aged between 0 and 15 years attributable to pedestrian crashes (Transport Accident Commission, 2007). These factors all contribute to parents' feeling that the local environment is not safe enough for their children to be walking to and from school. In response to this, parents drive their children to school, which further exacerbates the safety and health problems associated.

According to the Australian Transport Safety Bureau (Logan, 2008a), during the four-year period between 2002 and 2005 inclusive, 926 pedestrians were killed in Australia, contributing to around 14% of total road fatalities. Of these pedestrian deaths, 38 (an average of almost 10 per year) were between five and eleven years of age and of these, almost half (16) were killed between the hours of 8:00am to 9:00am and 3:00pm to 4:00pm. In Victoria during the same period, 321 child pedestrians aged between five and 15 years were seriously injured (Logan, 2008b), with 118 of those (37%) during school travel hours.

Childhood obesity is well recognised as a public health issue of significant community concern, with physical activity being a key factor in arresting obesity levels. As illustrated in the literature reviewed however, issues associated with pedestrian safety of children poses a significant barrier, therefore needing to be addressed first and foremost. The Star-Rating system is a practical, simple to use tool that aims to produce objective information that can direct attention to pedestrian safety priorities and subsequently, promote safe walking throughout communities. The development of the system was completed in mid 2008 and the current project aimed to pilot the system within realistic settings, as an initial step towards refining the accuracy of the tool. Successful implementation of the Star-Rating tool across communities aspires to benefit overall pedestrian safety.

## **Aims and Objectives**

The overall aim of the pilot study was to enhance pedestrian safety among primary school-aged children, while also promoting healthier lifestyles through greater participation in active travel. In order to achieve this, the primary goal was to pilot the previously designed Star-Rating tool within realistic community settings. More specifically, the objectives of the present study included:

- To engage four local primary schools in a trial application of the Star-Rating system;
- To evaluate the functional performance of the Star-Rating tool in determining the safety levels of selected crossings comparatively with that of subjective safety ratings determined by various rater-types;
- To identify the variables at different crossing locations, that in practice, contribute to unacceptable or lower safety levels;
- To assess the usability of the Star-Rating tool and further identify opportunities for its application in other communities and population groups; and
- To strengthen the current partnership between Caulfield Community Health Service (CCHS) and Monash University Accident Research Centre (MUARC) as a demonstration of inter-sector collaboration.

## **METHODOLOGY**

### **The Star-Rating model**

The Star-Rating model has been designed to take into account five main factors, considered the most influential in determining the risk of both crash and injury to a pedestrian. These include:

1. The speed limit applicable to drivers and riders at the crossing point during the periods when children walk to and from school;
2. The average number of vehicles per hour at the crossing point during the periods when children walk to and from school;
3. The width of road to be transversed to complete an individual crossing movement;
4. The number of directions of conflicting traffic that must be assessed by a pedestrian crossing at the crossing point; and
5. Whether there is a formal crossing facility provided (such as traffic signals, a school crossing, a zebra crossing, etc) to facilitate the crossing manoeuvre.

While the relationship between these factors and crash and injury risk for pedestrians tends to be self evident, these factors are also believed to be the major determinants of pedestrian safety (e.g. Jensen, 1999; Oxley, Corben, Fildes, O'Hare & Rothengatter, 2004). Furthermore, they have the additional advantage where the measures can be readily collected by users of the rating system, either during a site visit, and/or through information provided by the relevant road authorities.

These factors have been combined mathematically to produce star-ratings for individual crossing points, as measured by the Star-Rating tool. A detailed review of the mathematical development of the model and subsequent tool can be found in the Star-Rating School Walking Routes Monash University Accident Research Centre Report (Corben, Logan & Oxley, 2008).

## **Participant Recruitment and Study Design**

Four local primary schools from the City of Glen Eira, a metropolitan municipality in Melbourne, were recruited to participate in the pilot study. An advertisement containing a brief description for the study was placed in the school newsletters, asking for expressions of interest regarding participation in the study. A total of 18 parents and 20 children were recruited across the four primary schools. In addition, participants were also recruited from several organisations including Caulfield Community Health Service (CCHS), Monash University Accident Research Centre (MUARC), Glen Eira Local Government and VicRoads. In summary, recruitment aimed to cover a selection of different knowledge-based backgrounds regarding road safety spanning from the general community (e.g. parents and children) to professional opinions (e.g. MUARC and VicRoads employees) in the hope that a variety of subjective ratings would be collected.

A total of 24 crossing locations were assessed, which comprised of six crossing for each school. Based on the location of each primary school, a series of different crossing locations were selected with the aim of covering a wide range of situational factors relevant to the five determinant variables of the Star-Rating model.

## **Data Collection**

Data were collected from each school on four different days between the hours of 3:30pm until 4:00pm. This time was selected to reflect the time that children would normally be walking home from school in the hope of accurately accounting for similar traffic conditions, as well as other situational factors. Each crossing location was rated by a different rater-type (subject to availability of participants on the day).

The aggregate data were analysed using the Statistical Package for the Social Sciences (SPSS) program to address:

- Functional performance of the Star-Rating tool; and
- Usability of the Star-Rating tool.

Objective star-ratings were conceptualised in two forms: Integer-objective (e.g. 0, 1, 2, 3, 4, 5), as well as a continuous-objective star-rating with the potential for negative ratings to occur (e.g. -1.4, -0.88, 2.45, 4.62, etc). Given the Star-Rating tool is still in its initial piloting stages, the accuracy and sensitivity of the model may require adjustment. Subsequently, using two different conceptualisations of the objective star-rating accounts for this limitation, and may consequently contribute to identifying the best method for accurate interpretation.

## **RESULTS**

### **Functional performance of the Star-Rating tool**

#### *Relationships between objective and subjective star-ratings*

Correlation analyses were performed to investigate the strength of the relationship between various combinations of objective and subjective star-ratings. The means and standard deviations for the objective and subjective star-ratings were computed and summarised in Table 1. Results revealed that the mean integer-objective star-rating was slightly lower than the mean continuous-objective star-rating. This suggests that the integer-objective star-rating may be a more conservative estimate of crossing safety levels overall. The results also revealed that the post-subjective star-rating was slightly

lower than the pre-subjective star-rating. This indicates that raters provided a reduced estimate of safety after being introduced to the five crossing risk factors. An approximate two-star difference between the mean objective and subjective ratings was found overall.

Table 1 Means and standard deviations for the integer-objective, continuous-objective, pre-subjective and post-subjective star-ratings across the 24 crossing locations

|                                    | n  | Mean | Standard Deviation |
|------------------------------------|----|------|--------------------|
| Objective Star-Rating (Integer)    | 97 | 1.08 | 1.42               |
| Objective Star-Rating (Continuous) | 97 | 1.19 | 1.63               |
| Pre-Subjective Star-Rating         | 96 | 3.36 | 1.34               |
| Post-Subjective Star-Rating        | 94 | 3.10 | 1.35               |

*Pre-subjective versus post-subjective star-ratings*

Each rater was asked to rate their respective crossing twice. The pre-subjective rating quantified the raters’ initial impressions regarding the safety level of each crossing selected. The post-subjective rating was completed after raters were introduced to the five risk factors used to predict the objective star-rating at each crossing. The aim of comparing these two types of ratings was to identify whether consideration of the risk factors affected subjective perceptions of overall crossing safety.

A correlation analysis revealed that there was a significantly large correlation between the pre-subjective star-rating and the post-subjective star-rating,  $r = 0.88$ ,  $p < 0.01$ , two-tailed, where 78% of the variance in the star-ratings could be explained by raters being introduced to the five variables. A paired samples t-test revealed that there was a significant difference between the star-ratings of the pre-subjective star-rating group ( $m=3.36$ ,  $sd=1.34$ ) compared to the post-subjective star-rating group ( $m=3.10$ ,  $sd=1.35$ ),  $t(93) = 3.51$ ,  $p < 0.01$ , two-tailed.

These results indicate that the two subjective ratings were highly correlated. The latter rating (post-subjective), which introduced the rater to the five risk factors that determine the objective rating, resulted in a lower rating, on average, than the initial rating (pre-subjective). This implies that having considered the risk factors, raters were more likely to conclude that crossings were less safe than their initial impressions.

*Post-subjective versus integer-objective or continuous-objective star rating*

Post-subjective ratings were compared with the objective ratings of selected crossings. Given the five risk factors were introduced to raters before their latter ratings, the post-subjective rating in theory, entailed awareness and potential consideration of the risk factors contributing to crossing safety that paralleled with the objective rating. The aim of comparing these two types of ratings was to identify how well the Star-Rating tool measures matched with those of subjective evaluations. Objective star-ratings were analysed using two forms: integer values and continuous values.

By way of explanation, the model calculates a star-rating value based on a number of mathematical relationships estimating risk at the crossing location. This calculated star-rating (“continuous-objective”) is therefore continuous and may take on any value within the range. To enable comparisons with subjective star-ratings, as well as for standardisation against other similar Star-Rating systems, the continuous value star-rating is rounded down to the nearest whole star for general use. Furthermore, calculated ratings below zero stars and greater than five stars are capped

at zero and five stars respectively. This will be referred to hereafter as the 'integer-objective' star-rating. These two systems will yield different correlations with the subjective ratings and subsequently, will be considered separately.

A correlation analysis exploring the relationship between the post-subjective star-rating and the integer-objective star-rating revealed a significant, medium sized correlation between the two ratings,  $r = 0.45$ ,  $p < 0.01$ , two-tailed, where 21% of the variance in the star-rating could be explained by whether it was objectively or subjectively rated. An independent samples t-test revealed that there was a significant difference between the star-ratings of the post-subjective ( $m=3.10$ ,  $sd=1.35$ ) and integer-objective ( $m=1.08$ ,  $sd=1.42$ ) ratings,  $t(189) = 10.03$ ,  $p < 0.01$ , two-tailed.

Similarly, a correlation analysis between the post-subjective star-rating and the continuous-objective star-rating also revealed a significant, medium sized correlation,  $r = 0.52$ ,  $p < 0.01$ , two-tailed, where 27% of the variance in the star-rating could be explained by whether it was objectively or subjectively rated. An independent samples t-test revealed that there was a significant difference between the star-ratings of the post-subjective ( $m=3.10$ ,  $sd=1.35$ ) and continuous-objective ( $m=1.19$ ,  $sd=1.63$ ) ratings,  $t(189) = 8.76$ ,  $p < 0.01$ , two-tailed.

These results indicate that despite a relationship existing between the post-subjective and objective ratings overall, the objective ratings on average were significantly lower than the post-subjective ratings. At this time, a conclusion cannot be drawn in terms of the accuracy of each type of rating. It can only be concluded that a significant difference does exist between subjective and objective ratings, which may have implications on the utility of the Star-Rating tool within the community. These implications will be discussed in further detail below.

#### *Rating trends and patterns within rater-types*

There were a total of 24 objective ratings completed for the 24 crossing locations. Subjective star-rating values were explored within and between individual raters at each crossing location. Therefore, the results obtained comprised of 24 objective ratings, as well as, 94 complete pre- and post-subjective ratings.

Within each pair of ratings produced by an individual rater, 56 pairs did not differ in pre- and post-subjective ratings, 35 pairs differed by one star-rating and a further three pairs differed by two star-ratings.

Within the pre-subjective ratings across the 24 crossing locations, the majority ( $n=19$ ; 79%) of inter-rater variation at each selected crossing was between zero and two stars. In addition, three crossings had a variation of three-stars; one crossing demonstrated a variation of four-stars, while another crossing showed a discrepancy of five-stars amongst the different pre-subjective ratings.

A similar result was found for the post-subjective ratings across the 24 crossing locations where the majority ( $n=20$ ; 83%) of inter-rater variation at each selected crossing was also between zero and two stars. Furthermore, two crossings received a variation of three-stars; one crossing demonstrated a variation of four-stars, while another crossing showed a discrepancy of five-stars amongst the different post-subjective ratings.

#### *Objective ratings and inter-rater differences*

The comparison between objective ratings and post-subjective ratings revealed that a variation of one-star occurred at six crossing locations; two-stars occurred at four crossing locations; three-stars occurred at three crossing locations; four-stars at eight crossing locations; and five-stars at three crossing locations. As it can be seen, the discrepancy between objective and post-subjective ratings

were highly varied, which may suggest that the evaluation of underlying risk may be inconsistent between the raters and the objective Star-Rating tool. A detailed exploration of specific inter-rater differences can be found in the Star-Rating System for Pedestrian Walking Routes Report (Caulfield Community Health Service & Monash University Accident Research Centre, 2010).

To summarise, overall, the continuous-objective ratings were more highly correlated to the post-subjective ratings across different types of raters. An explanation for this finding may be that the integer-objective star-rating used a truncated value and may therefore produce greater variances by rounding off the otherwise, continuous value predicted by the Star-Rating tool. This finding has implications for the potential calibration of the Star-Rating tool and hence, important to note although it is outside the scope of the present study to explore this issue further.

Furthermore, the correlations revealed that objective and subjective star-ratings were most highly correlated when crossings were subjectively rated by MUARC raters. A possible explanation for this finding may be that road safety professionals may possess a greater awareness of crossing hazards and subsequently, rate crossing safety more conservatively compared to other types of raters.

### **Usability and influential nature of the Star-Rating tool**

In addition to assessing the functionality of the Star-Rating tool, an additional objective was to assess the usability of the tool, and its overall influence on community members who will subsequently be utilising the final version of the tool. More specifically, the collection of raters were asked to indicate the degree of difficulty they experienced in determining the risk factors associated with crossing safety. Parents alone were also asked about the likelihood of them utilising information from the Star-Rating tool if it were to be made readily available to them.

#### *Usability assessment of the Star-Rating tool*

The most significant aspect of the Star-Rating tool's utility is the ability to determine the five risk variables required for input; namely speed limit, total number of vehicles passing (per hour), number of traffic lanes, number of vehicle directions and crossing type. In terms of determining the input variables accountable for the star-rating outcome, most participants found it either easy (39.2%) or somewhat easy (38.1%) to respond to the variables. An exploration of qualitative data from participants highlighted various opportunities for improvements in the further development of the tool by addressing aspects such as:

- Determining speed limit when there are no visible speed signs available;
- Sustaining attention counting cars within the ten minute duration specified during the trial;
- Inclusion and exclusions of bike lanes and parking lanes;
- Determining whether to include nearby streets or judgement at varied types of intersections such as roundabouts; and
- Separating the different types of crossing types and at times, where more than one option may be appropriate.

#### *Influential nature of star-rating information*

The data revealed that most parents indicated that the availability of information regarding the safety of crossing locations would either somewhat likely (50%) or very likely (27.8%) influence their decision regarding their child walking to and/or from school. A closer analysis of the data from parents outlining other factors that would influence their decision regarding their child walking to/from school indicated issues surrounding the child (e.g. age and readiness of the child), the presence of other individuals (e.g. other children walking to school, supervision by an adult), and situational

circumstances (e.g. type of roads the child would need to cross: small side street versus main road, distance they would need to walk).

## **DISCUSSION**

### **Key findings and discussion**

The main goal of the present study was to pilot the Star-Rating tool within realistic settings. The main findings from the data analyses revealed that:

- Participants who took part in the trial were largely supportive of the Star-Rating concept such that the availability of such information would have the potential to influence their decision regarding their children walking to and from school; and
- An approximate two-star difference was established between objective and subjective ratings.

#### *Difference between post-subjective and objective star-ratings*

One of the main objectives of the present study was to explore the differences between subjective and objective star-ratings. More specifically, it was important for a comparison to be made between the post-subjective ratings with the two types of objective star-ratings. Regardless of which objective star-rating was compared with the post-subjective star-rating, there was an overall average of a two-star gap between the ratings. This difference raises questions about the accuracy of both subjective and objective ratings, relative to true ratings. It can be speculated that the higher subjective ratings may be due to a human tendency to underestimate the true levels of risk. "Optimism-bias", which refers to an intrinsic degree of optimism (Hatfield & Soames, 2000), combined with a less informed knowledge base in terms of factors affecting risk, may subsequently lead to repeated underestimates of the true role of speed, especially with respect to crash risk. Furthermore, it could also be speculated that the difference may also be due, in part, to the tool leading to underestimates of true levels of safety. Although these possibilities offer potential explanations for the results found, it is not possible at this point to draw final conclusions on these issues yet.

This finding is significant as it may have implications on the uptake and acceptance of the Star-Rating tool within the community. If the gap between perceived safety and actual safety as measured by the Star-Rating tool differs too greatly, it may affect the level of community confidence and the rating tool's credibility. This issue may be addressed through further refinement of the Star-Rating model and exploration as to whether the different weightings for each risk factor need to be adjusted. In addition, there is potential to explore whether the five risk factors are understood and appropriately considered by individuals utilising the tool. There may be a potential for the variation between the star-ratings to have occurred as a result of different knowledge backgrounds and awareness of potential hazards. This may explain why road safety professionals (MUARC raters) generally rated crossings less safe than other members of the community. It may be useful to calculate an average of inter-rater subjective star-rating for different sites in order to provide a more meaningful estimate of subjective risk perception.

#### *Usability of the Star-Rating tool*

The general consensus across most participants was that the Star-Rating tool method was relatively easy to follow. Although there were some opportunities identified by participants to improve the tools useability that are important to consider, refinement of the Star-Rating model may help clarify some of the issues associated with defining specific details such as number of vehicle directions near

intersections and crossing type. Once an increased understanding of the different options that may present for each risk factor have been established, clearer instructions and explanations can be designed and delivered with the Star-Rating tool. In order to achieve this, a larger sample of data is necessary and therefore a large-scale pilot of the tool may help to achieve this goal.

## **Limitations**

The main aim of the study was to pilot the Star-Rating tool within realistic settings in order to assess the tool's functional performance, as well as usability and acceptance within a community setting. The primary objectives were met with encouraging results overall and it was found that the tool was generally well accepted by community members. In exploring the results further, it became apparent that the main limitation of the study was the sample size and amount of data collected. Being a small scope pilot study, this produced constraints in the ability to compare a wide range of different crossings across different communities, subsequently impacting on the study's generalisability. Findings suggest that further work comparing a larger number of crossings would be valuable to undertake in the future.

## **Future Directions**

It would be interesting, and potentially valuable to implement the Star-Rating tool in different location settings dispersed across different parts of Australia to assess applicability of the tool across different population groups within the community and in different pedestrian environments. Whilst this may add to enriching the information within the data collected, it may also help to raise an increased awareness of potentially dangerous crossing locations. This awareness may then, in turn, trigger action in the form of physical changes to crossing conditions to provide safer crossing opportunities for pedestrians.

Therefore, a large-scale pilot study, using the Star-Rating tool across Australia, will be considered as a next step in building experience with the practical application of the Star-Rating tool. The aim would be to further develop the tool in a way that increases its functional performance. Once the tool is developed to an acceptable level, there may be the possibility of implementing it in various public health and road safety strategies of the future.

## **CONCLUSIONS**

In conclusion, the current research met its primary aim of trialling the Star-Rating tool in a small pilot study. Overall, there was good community acceptance of the tool. Future research should aim to address additional trialling of the tool in a greater variety of settings, as well as population groups, with the results used to help further develop and enhance the Star-Rating tool's reliability. This information can be expected to make a valuable contribution to low risk, active travel among primary school children, as well as overall pedestrian safety in other population groups within the community.

Finally, an important additional objective of the pilot study was to continue to strengthen the current partnership between Caulfield Community Health Service (CCHS) and Monash University Accident Research Centre (MUARC) to demonstrate additional benefits possible when organisations from different professional sectors collaborate to address a shared problem. While not measured in this study, the partner organisations regard the experience as highly successful and continue to support this form of collaboration.

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