Looking both ways:
The policy and implementation of protective traffic measures for New Zealand children

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INTRODUCTION

Motor vehicle harm to child pedestrians is a leading contributor to injury and mortality experienced by children in New Zealand. This review focuses on the 'environmental' aspects to this problem. In appraising published literature, implemented policies and interventions, this review explores identified risks, what has or will be done to address these and suggests areas for future research.

BACKGROUND

Road traffic accidents are a leading cause of morbidity and mortality in New Zealand children, causing significant distress for the children and their families[1], and accounting for 22% of all avoidable injury deaths in children aged 14 years and younger[2,3]. This risk is not distributed equally. Children in low income families and Māori and Pacific children are at the highest risk[2,4,5].

The significance of environmental factors

Consistent with international data, the area around schools and school recreation facilities are identified risk areas for child pedestrian accidents in New Zealand[6]. Unpublished 2005 data from the Ministry of Transport, quoted by other literature, cites that it is school-aged children who have the highest rates of traffic-injury, these predominantly occurring within the hour before and the hour after school times[7]. This is not solely explained by high numbers of children in an area as there is no evidence to suggest other locations, such as shopping centres, have similar rates. Additional risk in the environment adjacent to schools therefore exists.

Communities appear to be aware of this, as some parents report feeling anxious in letting their child walk to school due to perceived risk[8,9]. Contrary to this, environments which increase children's safety have positive effects in addition to injury prevention. Walking to school increases both the amount of exercise and the rate of interpersonal social behaviour in children[8, 10, 11]. Furthermore interviews with children have suggested that they may enjoy walking to school[8].

Recognition that the road environment is inherently dangerous is replacing the discourse that children are inherently vulnerable and need 'fencing in' to minimise their risk to themselves[12]. It stands to reason that those with a less accurate perception of risk in a dangerous situation are at increased risk. Some contend however that it is the time taken for children to correctly appraise dangerous situations that is the risk. Reaction times for children in difficult situations are generally slower than in adults, but a significant overlap in reaction times may exist[13]. Educative programmes for children are widely implemented to address these risks. However some contend that educational programmes do not appear to be reducing injury rates[3, 5]. This may be a myopic judgment. Pedestrian behaviour data surveyed by the Land Transport and Safety Authority (LTSA) does not include separate data for children, so it is difficult for such a conclusion to be drawn[14]. Furthermore, education may prevent increases in the rate of injury, a conclusion these studies cannot draw because of the nature of their design.

Reducing the risks an environment poses may reduce the rate of injury regardless of educative measures in place. Speed is a positive predictor of injury rate and severity[5, 15], even when accounting for other risk factors[16]. Efforts have been made to reduce speed around schools without structurally modifying the road, such as lowering the speed limit and using flashing signs[17]. It is unclear at this stage what effect this has had. Compliance rates with the legal speed limit across roads being surveyed are at best 85%, despite law enforcement and driver education[15]. Speed is not the sole contributing factor, increased traffic density and curb parking have also been identified[5, 6].

The New Zealand policy context

While prioritising walkways is a recurring theme in recent policy documents[9, 18], pedestrian transport has not been considered a priority historically. Indeed infrastructural development has emphasised private motor vehicle transportation[9, 19]. With Auckland's continual rapid pattern of low-density suburban development, the emphasis on private vehicle transportation has resulted in suburban streets handling more traffic than for which they were designed[5, 20].

It is at the discretion of each Regional Council Authority (RCA) to decide where traffic calming measures are placed. Presently there is no 'best practice' document used to guide this process. Most RCAs report that interventions are adopted in response to reported accidents or by advocacy. This process, guided by downstream determinants rather than by risk prediction, is not a uniform process[18]. Such an approach may undermine the central government's set objectives and make monitoring difficult. LTSA cites pedestrian activity as a key determinant of implementation. Yet when determining the efficacy of intervening measures, pedestrian activity is not measured before and after; a systematic bias may be introduced[18]. RCAs survey vehicle speed more consistently and more regularly before intervention implementation than pedestrian counts themselves, with no reported 'after' studies assessing the latter[18].

Traffic calming measures

Although some studies disagree[21], most international studies demonstrate that road modifications such as 'speed humps' have efficacy in reducing

injury rates. Data conflicts however, as to which street category to target[22, 23]. International studies contend that placing modifications in more deprived areas result in a reduction in injury rates[24], perhaps implying an initial deficiency. In addition to slowing the traffic[25], road modifications may also increase compliance to road rules in drivers. For example 'giving way' to children on bicycles increased to 86% from 6% previously, after installation of roundabouts at intersections in Norway[26]. Albeit, case reports have demonstrated that these road modifications must be clearly visible in order to reduce the possibility of pedestrians being injured by these measures[16].

Narrowing road space is the most commonly used traffic calming method on arterial and collecting roads whilst road bumps were the most common method used on local roads in New Zealand[18]. Restricting road width may in fact increase the risk to children, as it may reduce room for drivers to avoid hitting the child.

DISCUSSION

In addition to reducing traffic density, appraised ecological studies demonstrate or suggest the need to reduce traffic speed. The limited numbers of controlled before-and-after trials available appear to be heterogeneous, perhaps due to study designs managing variables differently. Thus, in order to ascertain the true efficacy of these measures robust randomised trials are necessary as these better assess causality. Discrepancies in findings may be due to confounding variables such as fluctuations in traffic on any given road, these are likely to be significant in applying international data to the New Zealand context but also apply area-to-area domestically. As such, care must be taken interpreting the implications of these findings.

It is well established certain populations bare the disproportionate burden of these preventable injuries – Māori, Pacific and children from low socioeconomic families. Studies need to explore what redress exists for these groups.

Whilst using 'accident sites' as case-controls may suggest areas needing more traffic-calming modifications, a preventative tool identifying such risk areas before accidents occur could be more effective than a reactive approach. Additional data gathered should focus on determining where interventions have worked for these populations and replicate successes. These would better guide New Zealand Transport Authority (NZTA) and RCA intervention.

Hence, it is not the absolute number of interventions implemented but the best utilisation that is the key to the effectiveness of interventions. A 'best practice' strategy would guide RCAs. It is regrettable that NZTA has not produced such a document to date. Such a document may reduce the variance in indices used to appraise risk whilst remaining responsive to community input regarding the need for intervention.

Peak injury times correlate with commuting times for children to and from school, and as such investigation needs to be conducted on streets adjacent to schools to determine what safety features are in place for children. Children in more deprived areas are deemed to be at more risk and, as such, a comparison between schools in highly deprived areas and those in least deprived areas may explore whether a difference in traffic-calming modification implementation exists similar to those seen internationally or, whether other factors explain this difference.

CONCLUSION

Policies and interventions deem improving the safety of pedestrians, particularly child pedestrians, as a matter of priority. Studies are necessary to independently assess how these have been acted upon. Efforts to 'keep children away' from the road downplay drivers' contribution to pedestrian injury. A review to determine the success of speed reduction interventions within the New Zealand context, specifically in areas with high risk populations (low socioeconomic status, Māori and Pacific populations) in areas around schools, could further guide future planning.

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