



Child pedestrian safety knowledge, behaviour and road injury in Cape Town, South Africa



Karin Koekemoer^{a,b,*}, Megan Van Gesselten^{a,b}, Ashley Van Niekerk^{a,b},
Rajen Govender^{a,b,c}, Arjan Bastiaan Van As^d

^a South African Medical Research Council-University of South Africa Violence, Injury and Peace Research Unit, PO Box 19070, Tygerberg, 7505, Cape Town, South Africa

^b Institute for Social and Health Sciences, University of South Africa, PO Box 1087, Lenasia, 1820, South Africa

^c Department of Sociology, University of Cape Town, Room 4.45, Fourth Floor, Leslie Social Sciences Building (Upper Campus), Rondebosch, 7701, Cape Town, South Africa

^d Childsafe South Africa and Department of Pediatric Surgery, Red Cross War Memorial Children's Hospital, Klipfontein Road, Rondebosch, 7701 Cape Town, South Africa

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ABSTRACT

Pedestrian injuries are a leading cause of death among South African children, and young children residing in low-income communities are more at risk, due to various factors such as inadequate road infrastructure, exposure to traffic due to reliance on walking as a means of transport, and lack of supervision. This study used a cross-sectional, non-randomized self-report survey to assess pedestrian safety knowledge, road-crossing behaviour and pedestrian injuries of primary school children in selected low-income settings in Cape Town. The survey focused on three primary schools that had joined the Safe Kids Worldwide Model School Zone Project and was administered to 536 children aged 6–15 years, in their home language of isiXhosa. Descriptive and bivariate analyses as well as multivariate regression analyses were conducted to investigate potential predictor variables for pedestrian collision severity and unsafe road-crossing behaviour. Walking was the sole form of travel for 81% of the children, with a large proportion regularly walking unsupervised. Children who walk to or from school alone were younger and reported riskier road-crossing behaviour, although children who walk accompanied tended to have higher pedestrian collision severity. “Negligent Behaviour” related to road-crossing was significantly associated with higher pedestrian collision severity, with predictors of “Negligent Behaviour” including the lack of pedestrian safety knowledge and greater exposure to traffic in terms of time spent walking. More than half of the reported pedestrian collisions involved a bicycle, and older boys (10–15 years) were most at risk of experiencing a severe pedestrian injury. The findings substantiate emerging evidence that children in low-income settings are at greater risk for child pedestrian injury, and emphasise the need for evidence-based safety promotion and injury prevention interventions in these settings.

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1. Introduction

In South Africa, pedestrian injury is the leading cause of injury mortality amongst children, with about 22% of all pedestrian deaths involving children younger than 15 years (Van der Merwe and Dawes, 2007; Road Traffic Management Corporation (RTMC), 2011). There is a concentration of pedestrian deaths in urban set-

tings (Sukhai et al., 2009). In the Western Cape, a South African province with a significant urban concentration, about 35% of pedestrian road crash fatalities are children aged 17 years or younger, with children under the age of 10 years most vulnerable (Vanderschuren and Jobanputra, 2010). According to a 2005 report by the City of Cape Town, the urban centre of the Western Cape Province, child pedestrians between 6 and 17 years of age represent about 14% of all pedestrian road crash casualties (fatal and non-fatal) in Cape Town (City of Cape Town, 2005).

The extent of children's physical, cognitive and emotional traits and abilities, including their temperament and personality, contribute to their vulnerability to pedestrian injury (McMahon et al., 2008; Peden et al., 2008; World Health Organization, 2011). Young

* Corresponding author at: South African Medical Research Council-University of South Africa Violence, Injury and Peace Research Unit, PO Box 19070, Tygerberg, 7505, Cape Town, South Africa.

E-mail address: karin.pretorius@mrc.ac.za (K. Koekemoer).

children's small physique limits their ability to see and be seen by oncoming motor vehicles, and as children's sensory facilities are less developed, they often have difficulty seeing cars in their peripheral vision and locating the direction of oncoming vehicles (Schieber and Thompson, 1996). Children's level of perceptual and cognitive abilities, combined with limited experience, manifest in skills that are not sufficient to adequately appraise and negotiate complex and common road situations (Dunbar et al., 2001; Schieber and Vegega, 2002).

The perceptual capacities required for traffic negotiation may follow an age-determined path (Ampofo-Boateng et al., 1993), with children younger than 9 years in general showing less appreciation of the danger posed by certain road-crossing sites, for example, where their view of the road is obstructed or where complex traffic movements occur, such as at an intersection (Ampofo-Boateng and Thomson, 1991; Thomson et al., 1992). Children usually opt for the most convenient or most direct route possible when crossing the road, even if this means crossing diagonally or in between parked cars in order to reach their destination (Ampofo-Boateng et al., 1993; Thomson et al., 1998). However, by the age of 11 years, children begin to show greater appreciation of road dangers (Ampofo-Boateng and Thomson, 1991). The child's appraisal of road danger and the required appropriate actions are also influenced by their gender. Boys tend to engage in greater risk-taking behaviour, report lower ratings of the risks to injury, are more likely than girls to attribute injuries to bad luck, and have a greater degree of optimism bias (believing that they are less likely to get hurt than other children) (Morrongiello, 1997; Schwebel and Barton, 2005).

In South Africa, as with other LMICs, a large proportion of the population are obliged to walk due to lower motorisation, with consequently higher pedestrian fatalities (Gupta et al., 2015; Mohan, 2002). The majority of South African children (68%) walk to and from school, rather than use other forms of road transport (Statistics South Africa, 2014). Children in informal and other low-income settlements are particularly dependent on walking as their primary means of transportation (Behrens, 2003; Peden, 1998; Statistics South Africa, 2014), while many of these settlements manifest various environmental risk factors, such as poor road infrastructure (Ribbens et al., 2008). In low-income communities there is also often a lack of adult supervision due to resource constraints or competing domestic or work demands (Chakravarthy et al., 2007; Waylen and McKenna, 2002), which may increase the risk of children engaging in risky road-crossing behaviour or sustaining a pedestrian injury (Desapriya et al., 2011).

The occurrence of child pedestrian injuries clusters around certain times of the day, with the most common times for fatal injuries being weekday afternoons (Hobday, 2009; Mabunda et al., 2008). The vulnerability of children, particularly those between the ages of 5 and 9 years, appear at least in part to be related to their significant exposure to high levels of commuting as they walk to school or to transport points (Arendse et al., 2012; Hobday, 2009). Most crashes occur within 2 km of the home of the victim, within residential neighbourhoods, with 60–70% of child pedestrian injuries attributed to the unprotected or improper crossing of the street (Desapriya et al., 2011; McComas et al., 2002; Malek et al., 1990). Wills et al. (1997) found that children who sustain a pedestrian injury in the immediate vicinity of their home were less likely to have adult supervision compared to those injured further away. A Cape Town study found that playing outside or running errands contributed to child pedestrian injury risk, and that the majority of children presenting with a pedestrian injury were not supervised by an adult at the time of the collision (Bass et al., 1995).

The research scholarship on child pedestrian knowledge, attitudes and behaviours related to the complex road safety environments in resource-restricted settings is limited, despite the concentration of the burden of injury in such settings. In South

Africa, despite national recognition of the child pedestrian injury and mortality burden, the ongoing and significant occurrence of these injuries suggest that the injury prevention response by existing projects and programmes requires significant and increased support to bring about the reduction in child pedestrian crash incidents as required by the United Nation's Decade of Action for Road Safety. This study therefore seeks to contribute to the knowledge platform required for the country's emerging child pedestrian safety intervention responses. The main objectives are, firstly, to assess the effects of children's pedestrian safety knowledge, exposure to road traffic, road-crossing behaviour and supervision levels on the severity of pedestrian collisions, and secondly, to assess the effects of children's pedestrian safety knowledge and education, exposure to traffic and supervision levels on their road-crossing behaviour. The secondary objectives are to examine the potential moderating effects of age and gender in the aforementioned relationships, and to examine differences with regard to gender, age, and level of supervision in terms of pedestrian safety variables.

2. Methodology

This study serves as part of the information platform required for the implementation of the Safe Kids Worldwide Model School Zone Project, which is a multi-country project focusing on the development of child-specific interventions and methodologies across a range of settings. The Safe Kids Project seeks to strengthen local environments, but also the individual child knowledge and behaviour required for child pedestrian injury prevention. Ethical clearance was obtained from a national research council before commencing with the study.

2.1. Study design

This study made use of a cross-sectional, non-randomized self-report survey to assess children's knowledge and behaviours related to pedestrian safety, as well as the incidence of pedestrian injuries, and pedestrian characteristics such as level of supervision and exposure to traffic. The measures were aligned with three key pedestrian safety domains, namely awareness of visibility, use of supervision, and road-crossing behaviour.

2.2. Study area

The study took place at three primary schools in Khayelitsha and Crossroads. Both residential areas are low-income communities in or on the periphery of Cape Town. These particular sites were identified by a national South African child injury prevention agency which coordinated the local implementation of the Safe Kids Worldwide Model School Zone Project. The focus was on settings in Cape Town with concerns of high traffic injury rates and where children are exposed to hazardous, high traffic volume roads that they are required to use in order to travel to and from schools (A.B. Van As, personal communication, May 2014).

Khayelitsha is to the east of the Cape Town city centre and has a population of 391 749. The majority of residents in the area are Black African (99%), and more than a quarter of the population are under the age of 15 years (28%). There are 118 809 households, with more than half living in informal dwelling structures (55%). The majority (74%) have a monthly household income of R3 200 or less (approximately \$224 US in September 2016 prices). Crossroads is adjacent to Khayelitsha but closer to the Cape Town city centre. It has a population of 36 043, with the majority of residents being Black African (97%). Most households (81%) have a monthly income of R3 200 or less, with about 46% living in informal dwellings. More

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