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Evaluation of inter-organizational traffic injury prevention in a WHO safe community

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Abstract

The objective of the study was to examine the effect of a community-based injury prevention program on traffic injuries. A population-based quasi-experimental design was used with pre- and post-implementation measurements in an intervention and a control area. The program was based on inter-organizational participation in detecting and taking action against traffic injuries. The total relative risk for traffic injury in the study area showed only a tendency to decrease following program exposure (odds ratio 0.91; 95% confidence interval 0.81–1.02). No change in relative risk was observed in the control area. The analyses of program impact on injury severity showed that the relative risk for moderate injuries in the study area was reduced by almost half (odds ratio 0.59; 95% confidence interval 0.49–0.69), the risk for severe or fatal injuries remained constant (odds ratio 1.27; 95% confidence interval 0.80–2.02), and the risk for minor injuries increased (odds ratio 1.34; 95% confidence interval 1.13–1.59). The relative risk for moderate injuries was reduced by at least half for mopedists, cyclists, pedestrians, and those leaving or entering a motor vehicle. Community-based injury prevention can be a complement to national traffic safety programs.

Keywords: Evaluation; Traffic injuries; Community intervention; Community safety promotion; Prevention; WHO safe community

1. Introduction

Traffic injuries are a great burden on communities and health care systems world wide. In 1995, 42 000 people were killed in road accidents in the United States (Fingerhut and Warner, 1997). In the developing world, the situation is even more grave, and in these countries, traffic injuries constitute one of the largest public health problems. By the year 2020, it is projected that road-traffic injuries will cause a loss of 64 million disability-adjusted life years in these countries (Murray and Lopez, 1997). Until recently, when discussing traffic injury prevention, most attention has been paid to motor vehicle crashes (Haddon, 1972; CDC, 1994). However, in the light of the fact that today many other than motor vehicle drivers and passengers are injured in the traffic (Lindqvist, 1991; Eilert-Petersson and Schelp, 1997, 1998), there is reason to take a close look at the other groups. Many of these are at risk of complicated injuries, which besides the human suffering, also consume a considerable share of scarce health care resources. There is, therefore, a need to identify and evaluate traffic injury prevention programs today, addressing not only motor vehicle crashes. It is well known today that interventions aimed at improving traffic safety can be implemented at different social levels, targeting smaller or larger groups, and including education, structural changes or a combination of these (Haddon, 1980). Although programs can be formulated specifically in any of these areas, the community-based model, adapting a broad set of interventions to the local cultural, social, and organizational environment, has emerged as an especially promising way to implement co-ordinated preventive actions (Towner, 1994;

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Downswell et al., 1996). Such integrated actions are also central for the maintenance of traffic safety. For instance, in communities where urban planning has taken child safety into account through measures aimed at separating motor traffic from cyclists and pedestrians, there appear to be significantly fewer injuries (Pless et al., 1989). The aim of the present study is to evaluate the effect on traffic injuries of such a model, the WHO Safe Community program. In particular, the aim is to study the effect on the pattern of traffic injuries treated in health care before and after the program implementation using a quasi-experimental design.

1.1. Background

The evaluated Safe Community program has been implemented in Motala municipality in the western part of Östergötland county in Sweden. An assessment of the program structure and process has previously been reported (Lindqvist et al., 1996). The theoretical framework for the program is based on a participative strategy for community involvement. Using national injury prevention programs as a background, the preventive actions rely on local community aims and resources. The program goals include,

organization of a local cross-sectoral action group;
reliance on existing local community networks; and
continuous tracking of high-risk environments and groups.

Regarding traffic injuries, the aim of the community analysis stage of the program (Bracht and Kingsbury, 1990), performed in 1983–1984, was to study the local epidemiology of traffic injuries, to follow the economic consequences of the injuries, and to analyze the local social structure and values (Lindqvist, 1991; Lindqvist et al., 1996). Groups found to be at particular risk were mopedists aged 15–16 years and elderly female pedestrians. Stage two, the program design and initiation (1985–1987) included organizing the management of the intervention and setting local planning goals. The district Health Services Board, the Municipal Board, and political committees and management groups were approached to accept responsibility for program actions. The goal set for the program was to reduce the total injury incidence in the municipality by 25% by the year 2000. The design evolved into a program of action during the *implementation* stage (1987–1988). The planning and content of prevention work was guided by a Traffic Safety Council made up of 20 delegates representing the municipality departments with responsibility for road maintenance, urban planning, schools, child care and care of the elderly, the National Road Safety Office, the National Road Administration, the Swedish Road and Traffic Research Institute, and the local Police department. This group had regular meetings twice a year. From the Traffic Safety Council, a task force meeting each month was held, consisting of representatives from the police, schools, parents' organizations, the municipality road maintenance office, and local motor organizations. For structural changes, the task force used two main sources of reference; the Swedish guidelines for urban planning and traffic safety (SCAFT) and an updated geographical inventory of local trouble spots. With these as a background, changes in the physical environment were suggested and implemented. The focus was on free foot spaces and traffic calming spaces in residential areas. For example, a 'Safe way to school' program to identify and adjust trouble spots was performed with the cooperation of the primary schools and the municipality's planning department, and a 'Cut your garden hedge' initiative was promoted to increase driveway visibility in residential areas. However, measures were also directed towards motor transport spaces, e.g. by improvements in the winter road maintenance. Concerning education, the focus was on teaching traffic rules and safety norms to children and teenagers. Voluntary organizations and the police arranged traffic education programs aimed at primary and lower-secondary school levels. A 1-h traffic lesson was scheduled every week for all fourth-graders. In addition, a bicycling safety program was initiated in which parents of 5-years-old were able to buy a helmet at a subsidized price, and where bike helmet use was promoted among primary school children. Furthermore, courses were offered for school children to 'shape up your bike'. Combined actions were focused on specific areas. A child safety seat loan program was developed as a demonstrator project and a falling prevention program was composed for the elderly. At stage four, program *maintenance–consolidation* (1989–1995), the facilitator withdrew from the Traffic Safety Council and intervention activities were integrated completely into existing community networks. The final stage, *evaluation* (1995–1999), focuses on assessing and reporting from the program.

2. Materials and methods

A quasi-experimental design (Cook and Campell, 1979) was used with pre- and post-implementation measurements in the intervention area and in a neighboring control municipality in Östergötland county. The main intervention effect was studied using prospective registration of all acute care episodes during the study period. Since the study areas were not randomly chosen, environmental indicators were studied. To avoid bias, the research team was composed of evaluators who had not taken part in the implementation and program managers with experience of the program process.

2.1. Data collection

The pre-implementation study period covered 52 weeks from October 1, 1983 to September 30, 1984. The post-implementation period covered 52 weeks from January 1, 1989 to December 31, 1989.

Data were collected for all patients arriving at a health care unit located in the study areas during the study periods. A report form with the time of contact and standard personal data was filled out by staff at the care unit. On the same form was registered whether unintentional injury was a possible reason for the contact.

Two specially trained nurses made an injury classification from the medical records after the care episode. When necessary, the attending physician was asked to classify the injury. The registration model was based on experience from earlier prevention programs in Sweden (Schelp and Svanström, 1987).

The routine for data collection was tested in a pilot project. Before starting each study period, the staff at all relevant health care units was carefully informed and the routine was practiced for two weeks.

2.2. Validity and reliability tests

To identify confounding social trends, population variables possibly related to injury incidence were selected with the guidance of social change theory (Rothman, 1974; Carley, 1981). Data regarding population age and sex mix, sites of residency, education, income, employment, number of motor vehicles, and national totals of hospital care consumption and deaths due to traffic injuries were collected retrospectively from national registers (Statistics Sweden) for the study periods. The study area had four health care centers and a county annex hospital with a casualty department, whereas the control area shared the annex hospital and had two health-care centers, one of them with an emergency unit. The use of acute health care services at these units was followed by recording data from all attendances during both registration periods. Both the study and control areas are situated 50 km from Linköping University Hospital. Systematic differences between the areas regarding injured persons attending for care outside the registration areas were sought by analyzing all attendances at the emergency departments of the university hospital during September 1984. Fatal injuries other than those recorded in the study were researched by analyzing the local police records.

To estimate the quality of the specific injury registration procedure, secondary sampling of all acute health care attendances in the study area was undertaken during the third week of the pre-implementation registration period and in both the study and control areas during the third week of the post-implementation registration period.

2.3. Definitions

Traffic injuries were defined in the present study as, first, injuries sustained in accidents involving at least one vehicle of any kind and, second, pedestrians injured in an accident not involving another person or vehicle, e.g. an injury caused by slipping or stumbling.

The ICD-8 classification was used to classify the diagnosis and location or cause of the injury (WHO, 1965), and the abbreviated injury scale (AIS, American Association for Automotive Medicine, 1980) was used as a measure of the severity of the injury.

2.4. Analysis

The relative risk of injury with regard to the factor 'exposure to the Safe Community program' was estimated by the odds ratio. Injuries where an individual was injured for the second time or more during a study year were excluded from the calculations. The intervals used for the breakdown of the population by age and sex were chosen with regard to the target groups for the interventions. The analysis took into account risk exposure by attending to the fact that not the entire population was at risk of all injury types, e.g. children do not drive. The denominator in the risk estimates was adjusted accordingly. Descriptive statistics and confidence intervals were calculated using the SPSS software package.

3. Results

3.1. Environmental indicators

The total number of hospital-treated traffic accident victims in Sweden increased by 15% from 10650 to 12250 between 1984 and 1989, while the number of traffic-related deaths remained constant. The age and sex mix in both the study and control area was stable between the registration periods and was close to the national average. Residential and income characteristics also remained stable. The educational level in both areas was slightly below the national average but showed a tendency to increase. The number of motor vehicles owned by residents increased by 12% in the study area and by 13% in the control area. No extraordinary weather conditions were observed during any of the study periods.

3.2. Quality of registrations

During the pre-implementation registration period, which also includes non-traffic injuries, identity data were missing for 18 of the 4926 injured patients (0.4%)

in the study area and 23 (0.9%) of the 2694 injured patients in the control area. During the post-implementation period, which also includes non-traffic injuries, ten of the 4287 injured patients (0.2%) in the study area could not be identified in the medical records. For six of the 2746 injured patients (0.2%) in the control area, identity data were missing.

In the registration control during the pre-implementation period, five (5%) of the 102 injuries observed secondarily were found not to have been registered in the study area, three had, mistakenly, not been registered as injuries and two others were found not to have been recorded. During the post-implementation period in the study area, four (5%) of 84 injuries observed secondarily had not been registered, these had not been recorded. In the control area, seven (14%) of 51 secondarily observed injuries had not been registered, three had, mistakenly, not been registered as injuries and four others had not been recorded.

A lower share of all injured residents from the study area (11/422, 3%), than from the control area (28/253, 12%), was found to have been directly provided with acute care at the university hospital during the month of the control study.

3.3. Relative risk

In the study area, the total relative risk for traffic injury showed only a tendency (odds ratio, 0.91; 95% confidence interval 0.81–1.02) to decrease following exposure to the program. In the control area, no change in relative risk was observed. While no decrease was observed among females in the study area, a decrease was observed for males in the age group 0–15 years (Table 1). The analysis of program impact on injury severity showed that the relative risk for moderate injury in the study area was reduced by almost half (odds ratio, 0.59; 95% confidence interval 0.49–0.69), and the risk for severe or fatal injuries remained basically constant (odds ratio, 1.27; 95% confidence interval 0.80–2.02). Simultaneously, the risk for minor injury increased by about one third (odds ratio, 1.34; 95% confidence interval 1.13–1.59).

3.4. Transportation type

In the study area, the total relative risk for traffic injury showed a clear decrease only among mopedists. However, the relative risk for moderate injuries was reduced by at least half for mopedists, cyclists, pedestrians, and those leaving or entering a vehicle. The risk of severe or fatal injury was initially highest among cyclists and did not change (Table 2).

3.5. Anatomical location

In the study area, the total relative risk decreased for injury to the upper and lower extremities. For moderate injury, the relative risk was reduced by approximately a half for injury to the upper extremities, lower extremities, and for multiple-site injury. Paradoxically, the risk of severe or fatal injury (AIS 3–6) to the spine, chest, and pelvis increased approximately three-fold (Table 3).

4. Discussion

The study showed that the total risk of sustaining a traffic injury requiring health care was not reduced significantly following the introduction of the Safe Community program. However, a decrease was observed among young boys and low-speed vehicle road-users; in particular, the risk of sustaining a non-minor injury did decrease. Analysis of the environmental indicator data suggests that the use of high-speed motor vehicles (cars, buses, motorcycles) did not change. In other words, according to these indicators, the road traffic volumes were constant between the study periods in the study and control areas.

Traffic safety has been pursued by efforts aimed at reducing traffic volume, decreasing the number of injury events, and reducing the harm resulting from injury (Gunnarsson, 1996). The evaluated program did not have a predefined focus in any of these areas, but had instead a sociogeografic demarcation. Because major roads and highways in Sweden are maintained and regulated by national agencies, the Safe Community program did not concentrate on risks in traffic spaces designated for high-speed vehicles. On the contrary, it focused on the local neighborhoods, using structural and educational resources in the community itself to increase safety when residents get from one place to another. The results suggest that even though neither the high-speed traffic volume nor the total number of injury events decreased compared with those of the control area, the program can be interpreted as successful because the parameters related to neighborhood commuting showed the desired trend. Injury rates and severity decreased specifically in the relevant population groups identified as being at high injury risk in the local analysis, e.g. mopedists and pedestrians.

The largest decrease in the total number of injuries was observed among boys younger than 16-years-old. This was a desired program effect for two reasons. First, the group was targeted, being at the highest pre-program risk of sustaining traffic injuries. Second, children and the elderly are the main ‘inhabitants’ of the local neighborhood during the day time, because it is their main dwelling and commuting area. One major contribution to the specific decrease among boys can be

Table 1
Relative risk (95% confidence interval) estimated by odds ratio for traffic injuries, number of injured, and individuals at risk in the study area (Motala) and control area (Mjölby) for the registration periods

	Study area						Control area					
	Men		Women		Total		Men		Women		Total	
	1983–1984	1989	1983–1984	1989	1983–1984	1989	1983–1984	1989	1983–1984	1989	1983–1984	1989
Age 0–15												
Injured	114	79	62	45	176	124	43	34	30	27	73	61
Non-injured	4267	4211	4123	3980	8390	8191	2811	2606	2659	2529	5470	5135
Odds ratio	0.70 (0.53–0.94)		0.75 (0.51–1.11)		0.72 (0.57–0.91)		0.85 (0.54–1.34)		0.95 (0.56–1.60)		0.89 (0.63–1.25)	
Age 16–29												
Injured	88	97	44	60	132	157	47	48	22	29	69	77
Non-injured	3896	3941	3688	3649	7584	7590	2455	2617	2230	2306	4685	4923
Odds ratio	1.09 (0.81–1.46)		1.38 (0.93–2.04)		1.19 (0.94–1.50)		0.96 (0.64–1.44)		1.27 (0.73–2.23)		1.06 (0.77–1.47)	
Age 30–49												
Injured	55	63	55	51	110	114	17	20	14	21	31	41
Non-injured	5466	5780	5199	5440	10 665	11 220	3532	3693	3331	3482	6863	7175
Odds ratio	1.08 (0.81–1.46)		0.89 (0.60–1.30)		0.99 (0.76–1.28)		1.13 (0.59–2.15)		1.43 (0.73–2.83)		1.27 (0.79–2.02)	
Age 50												
Injured	82	58	120	114	202	172	14	20	34	44	48	64
Non-injured	6571	6491	7602	7651	14 173	14 142	3969	3958	4650	4621	8619	8579
Odds ratio	0.72 (0.51–1.00)		0.94 (0.73–1.22)		0.85 (0.70–1.05)		1.43 (0.72–2.84)		1.30 (0.83–2.04)		1.34 (0.92–1.95)	
All												
Injured	339	297	281	270	620	567	121	122	100	121	221	243
Non-injured	20 200	20 423	20 612	20 720	40 812	41 143	12 767	12 874	12 870	12 938	25 637	25 812
Odds ratio	0.87 (0.74 – 1.01)		0.96 (0.81–1.13)		0.91 (0.81–1.02)		1.00 (0.78–1.29)		1.20 (0.92–1.57)		1.09 (0.91–1.31)	

Table 2
Relative risk (95% confidence interval) estimated by odds ratio for traffic injuries, number of injured, and individuals at risk in the study area (Motala) for the registration periods classified according to type of transportation and injury severity

Type of transportation	Injury severity									
	Minor (AIS 1)		Moderate (AIS 2)		Serious-fatal (within 24 h) (AIS 3–6)		Unknown		All	
	1983–1984	1989	1983–1984	1989	1983–1984	1989	1983–1984	1989	1983–1984	1989
Car drivers										
Injured	21	31	20	18	7	7	0	2	48	58
Non-injured	31 559	32 243	31 560	32 256	31 573	31 267			31 532	32 216
Odds ratio	1.44 (0.83–2.51)		0.88 (0.47–1.66)		0.99 (0.35–2.82)				1.18 (0.81–1.73)	
Car passengers										
Injured	11	18	10	12	2	3	0	2	23	35
Non-injured	41 421	41 692	41 422	41 698	41 430	41 707			41 409	41 675
Odds ratio	1.63 (0.77–3.44)		1.19 (0.52–2.76)		1.49 (0.25–8.92)				1.51 (0.89–2.56)	
Motorcyclists										
Injured	6	7	13	14	2	3	0	0	21	24
Non-injured	31 574	32 267	31 567	32 260	31 578	32 271			31 559	32 250
Odds ratio	1.14 (0.38–3.40)		1.05 (0.50–2.24)		1.47 (0.25–8.79)				1.12 (0.62–2.01)	
Mopedists										
Injured	18	20	23	5	1	1	0	0	42	26
Non-injured	33 465	33 966	33 460	33 981	33 482	33 985			33 441	33 960
Odds ratio	1.09 (0.58–2.07)		0.21 (0.08–0.56)		0.99 (0.06–15.8)				0.61 (0.37–0.99)	
Cyclists and pillion passengers										
Injured	92	112	142	87	12	15	1	1	247	215
Non-injured	39 414	39 435	39 364	39 460	39 494	39 532			39 259	39 332
Odds ratio	1.22 (0.92–1.60)		0.61 (0.47–0.80)		1.25 (0.58–2.67)				0.87 (0.72–1.04)	
Pedestrians										
Injured	55	74	120	67	8	8	0	0	183	149
Non-injured	41 377	41 636	41 312	41 643	41 424	41 702			41 249	41 561
Odds ratio	1.34 (0.94–1.90)		0.55 (0.41–0.75)		0.99 (0.37–2.65)				0.81 (0.65–1.00)	
Passengers entering or leaving a vehicle										
Injured	23	37	23	5	0	2	0	0	46	44
Non-injured	41 409	41 673	41 409	41 705	41 432	41 708			41 386	41 666
Odds ratio	1.60 (0.95–2.69)		0.22 (0.08–0.57)			–			0.95 (0.63–1.44)	
Others										
Injured	4	11	6	3	0	2	0	0	10	16
Non-injured	41 428	41 699	41 426	41 707	41 432	41 708			41 422	41 694
Odds ratio	2.73 (0.87–8.58)		0.50 (0.12–1.99)			–			1.59 (0.72–3.50)	
All										
Injured	230	310	357	211	32	41	1	5	620	567
Non-injured	41 202	41 400	41 075	41 499	41 400	41 669			40 812	41 143
Odds ratio	1.34 (1.13–1.59)		0.59 (0.49–0.69)		1.27 (0.80–2.02)				0.91 (0.81–1.02)	

Table 3
Relative risk (95% confidence interval) estimated by odds ratio for traffic injuries, number of injured, and individuals at risk in the study area (Motala) for the registration periods classified according to diagnosis and location or cause of injury and injury severity

Location or cause	Diagnosis[a]	Injury severity									
		Minor (AIS 1)		Moderate (AIS 2)		Serious-fatal (within 24 h) (AIS 3–6)		Unknown		All	
		1983–84	1989	1983–84	1989	1983–84	1989	1983–84	1989	1983–84	1989
Head	I										
Injured		46	47	51	47	8	12	0	1	105	108
Non-injured		41 386	41 663	41 381	41 663	41 424	41 698			41 327	41 602
Odds ratio		1.01 (0.68–1.52)		0.92 (0.62–1.36)		1.49 (0.61–3.65)				1.02 (0.78–1.34)	
Upper extremities	II										
Injured		35	37	109	72	3	4	0	0	147	113
Non-injured		41 397	41 673	41 323	41 638	41 429	41 706			41 285	41 597
Odds ratio		1.05 (0.66–1.67)		0.66 (0.49–0.88)		1.32 (0.30–5.92)				0.76 (0.60–0.98)	
Spine, chest, and pelvis	III										
Injured		21	18	27	16	3	11	0	0	51	45
Non-injured		41 411	41 692	41 405	41 694	41 429	41 699			41 381	41 665
Odds ratio		0.85 (0.45–1.60)		0.59 (0.32–1.09)		3.64 (1.02–13.1)				0.88 (0.59–1.31)	
Lower extremities	IV										
Injured		39	41	81	45	13	13	1	0	134	99
Non-injured		41 393	41 669	41 351	41 665	41 419	41 697			41 298	41 611
Odds ratio		1.04 (0.67–1.62)		0.55 (0.38–0.79)		0.99 (0.46–2.14)				0.73 (0.57–0.95)	
Lacerations and injuries at multiple sites; crush injuries	V										
Injured		84	165	89	29	4	0	0	0	177	194
Non-injured		41 348	41 545	41 343	41 681	41 428	41 710			41 255	41 516
Odds ratio		1.95 (1.50–2.54)		0.32 (0.21–0.49)						1.09 (0.89–1.34)	
Other	VI										
Injured		5	2	0	2	1	1	0	4	6	9
Non-injured		41 427	41 708	41 432	41 708	41 431	41 709			41 426	41 701
Odds ratio		0.40 (0.08–2.05)				0.99 (0.06–15.9)				1.49 (0.53–4.19)	
All											
Injured		230	310	357	211	32	41	1	5	620	567
Non-injured		41 202	41 400	41 075	41 499	41 400	41 669			40 812	41 143
Odds ratio		1.34 (1.13–1.59)		0.59 (0.49–0.69)		1.27 (0.80–2.02)				0.91 (0.81–1.02)	

[a] Specification of diagnosis (International Statistical Classification of Diseases, Injuries, and Causes of Death, 1965 revision), I, 800–804, 830, 850–854, 870–874, 879, 910, 930–933, 935; II, 810–819, 831–834, 840–842, 880–887, 912–915; III, 805–809, 846–848, 860–869, 875–878, 911, 934, 936–939; IV, 820–829, 835–839, 843–845, 890–897, 916–917; V, 900–907, 918, 920–929; VI, 940–999.

the fact that Safe Community program did not consider children 'small adults', neither from biological, psychological, nor social aspects (Sandels, 1968). For instance, small children are not able to read road signs or tell between left and right, and they have a limited field of vision. This strategy explains, for instance, the paradox that seemed to emerge when the program was adjusted to target children of different ages, because the interventions were based on the adults in the community. The reason is that it was acknowledged that children do not learn ways to behave in traffic from abstract instructions, but through interaction with older and more experienced role models. Structural interventions for increasing traffic safety for children, such as repairing bikes or attending to traffic trouble spots close to schools, had also to be recognized primarily and were found important by the adults in the community. To develop this recognition in the community, the constitution of inter-organizational networks working in a coordinated manner towards local traffic safety was central when establishing local dialogues with community members, e.g. at schools and day-care centers.

The rate of moderate injuries was more reduced than the total number of injuries. An explanation can be that the basis of the Safe Community program was community participation, meaning that the local life-style and traditions were regarded as the point of departure when deciding on interventions. This approach to injury prevention is different from the expertise-based means of changing traffic behavior often used in national programs addressing road safety. The facts that the traffic volume did not decrease and the minor reduction in the total number of injury-causing events are probable consequences of the empowerment strategy. The specific decrease of moderate injuries can, thus, be a consequence of the fact that the program was based on democratic principles, and that the community decided to set aside resources to maintain a local environment, which prevents unintentional harm to the individual without intruding on personal or group integrity (Haddon, 1968). In other words, the cooperation between the local organizations with interest in traffic safety and community residents resulted in a combination of psychosocial (knowledge, values) and physical (roads, landscape, buildings) changes, which together contributed to bringing down the dose of injury in injury-causing events. A serious shortcoming of the program is still that no effect was observed on the most severe injuries. While also taking into regard that the observed incidence was too low for reliable statistical analyses, this can have several explanations. For instance, a considerable number of the severe injuries were sustained in road crashes in traffic spaces not focused on in the present program. An example is the injuries sustained in highway accidents, where the road safety and maintenance is administered by national agencies.

The study design had potential shortcomings. Single-pedestrian injuries were classified as traffic injuries and included in the program. This may lead to difficulties in comparing the results with other studies, which have followed more strictly the ICD definition of traffic injury. However, as the focus of the Safe Community model was on the local neighborhood, it was logical to include also non-collision pedestrian injuries both in the program and the evaluation. It has still to be acknowledged that not all relevant injuries were included in the evaluation. Recent studies have shown that children are more prone to suffer from post-traumatic shock disorder (PTSD) following traffic accidents compared with the children who have sustained other types of injuries (Stalard et al., 1998). Psychological sequelae were not included in the present severity ratings, and should be considered in future studies. Also, the calculations of odds ratios in a cohort study may be questioned (Lee, 1994). In the present setting, the incidence of injuries was, however, in the optimal interval ($<10\%$) to avoid overestimations (Zhang and Yu, 1998). Finally, to rule our random fluctuations, the study would have ideally been extended to several years before and after the intervention. However, in the planning of the study, a choice was made to concentrate on high-quality collection of a broad set of data during two short time periods, in favor of long-term collection of data corresponding to a more limited set of variables. The decision was based on careful consideration of both alternatives, and was carried out according to a detailed plan including, e.g. training in injury severity classification for health care professionals.

The Safe Community model can be a complement to national road safety programs and transportation product development. The national programs addressing alcohol and drug control, speed limits, and seatbelt use still remain critical in order to keep down the number of severe road injuries. A shared community awareness of hazards was found to be essential to be able to support the groups at highest risk. Although it was decided to include a formulation of norms as program actions, few formal regulations were used. An exception was the lowering of speed limits in certain residential areas. Most rules had the nature of suggested 'social norms'. Here, a cautionary remark has to be made based on the cultural setting of the study. In Sweden, there is a tradition of broad participation in popular movements and collective action. In regions characterized by an individualistic culture, a similar outcome from a program based on collective action may require more effort.

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