Insights into in-depth accident investigation

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Safety of vulnerable road users in urban areas

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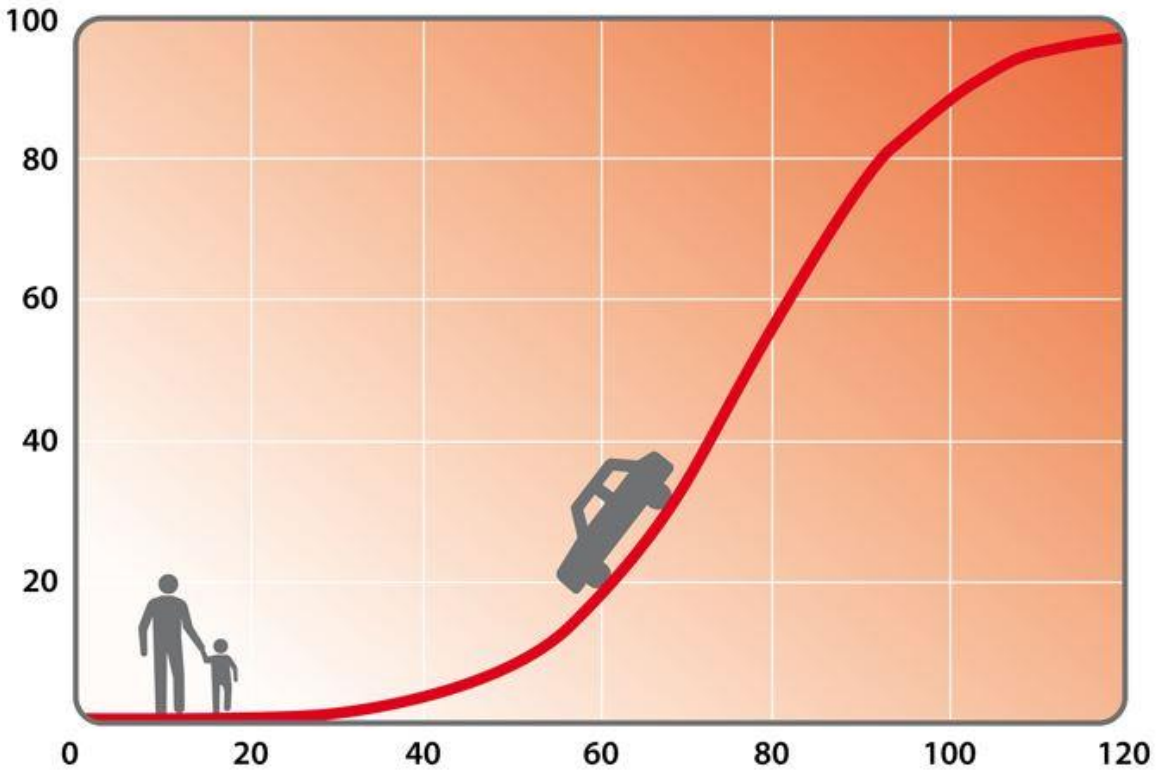
Pedestrian fatality risk



Original data: Pasanen E. (1991)
Graphics by
Source : Liikenneturva – Finnish Road Safety Council

Pedestrian fatality risk

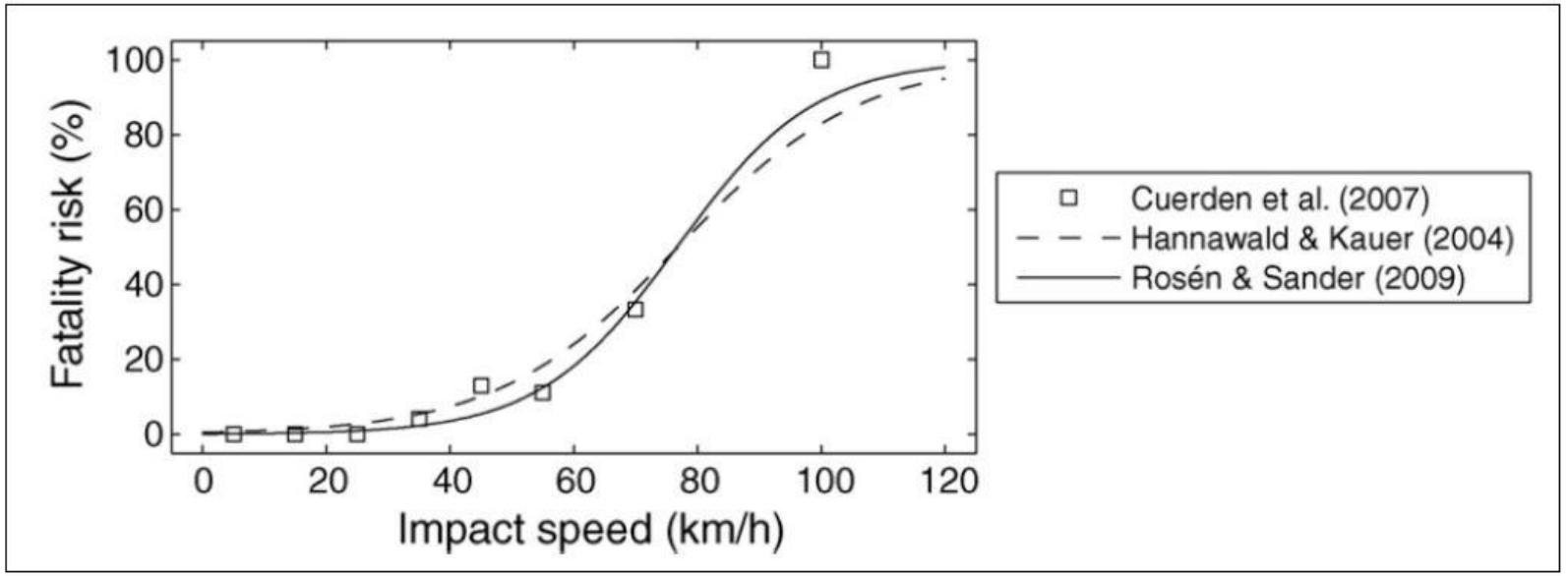


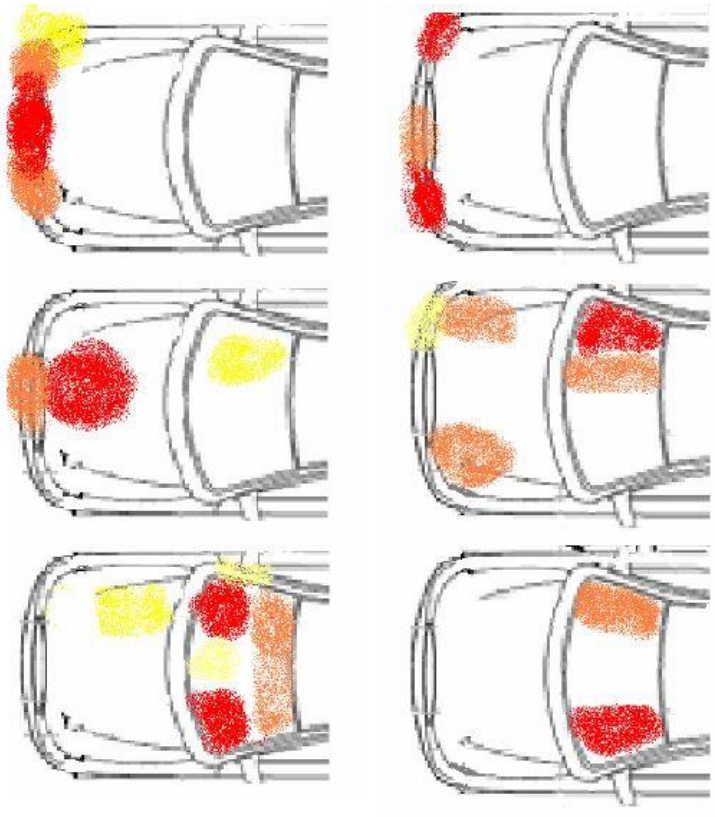
Figure 1. *The fatality rate of pedestrians in crashes with passenger cars as function of the collision speed (from Rosén et al., 2011).*

KOLKUTA study

- Study commissioned by national transport safety programme LINTU
- Material from years 2000 – 2005
- Data from Accident data register maintained by Finnish Motor Insurers' Centre
- Total of 496 accidents in urban areas
- 281 accidents involving pedestrian, bicyclist or moped driver

Kelkka M. et al (2006): Crash violence within the traffic system. Fatal accidents in built-up areas

Contact points in cars in pedestrian/bicycle accidents



First contact, usually legs

Pelvis, upper torso

Head

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KOLKUTA study

Car driving speed before reaction	Pedestrian collisions	Bicycle collissions
1-10 km/h	0	6
11-20 km/h	0	3
21-30 km/h	7	3
31-40 km/h	14	6
41-50 km/h	20	13
51-60 km/h	6	4
61-70 km/h	1	1
Not known	1	0
Total	49	36

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Car collision speed in pedestrian accidents

ISS	Törmäysnopeus (km/h)								
	0-20 km	21-25	26-30	31-35	36-40	41-45	46-50	51-60	ei tied.
11-20p	0(1)					1	1		0(1)
21-30p	0(1)	1(2)	2(1)	2	7(2)		1	1	
31-40p	0(1)		1		1(1)	1	2	3	
41-50p				1	0(2)	2	1		
51-60p							1		
61-75p			0(1)		1	2	5		

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Car collision speed in bicycle accidents

ISS	Törmäysnopeus (km/h)								
	0-10	11-20	21-25	26-30	31-35	36-40	41-45	46-50	51-60
11-20p								1	
21-30p	1(4)	1(1)		1(1)	1	1(1)			
31-40p			(1)	1		1	2	(1)	1
41-50p	1	1			1	(1)	2	3	1
51-60p									
61-75p	(2)			1		1		1	

Kelkka M. et al (2006): Crash violence within the traffic system. Fatal accidents in built-up areas

SafetyNet study

- SafetyNet –study
- 1006 accidents of various consequences investigated
- 180 VRU accidents
  - 153 in urban areas

SafetyNet results

Vehicles in pedestrian accidents

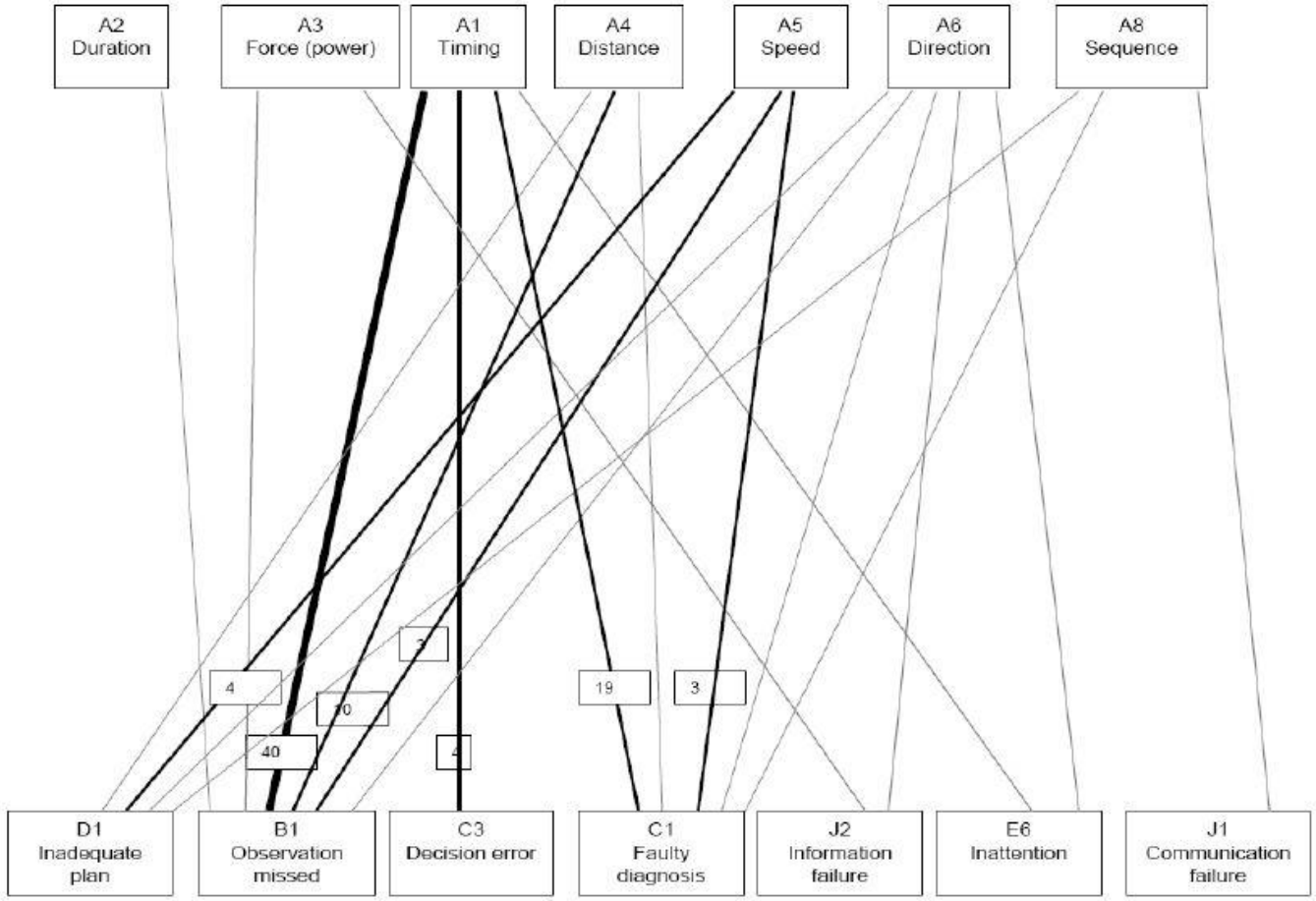

Figure 97, SNACS links from critical events to 1st level causes: vehicle drivers in pedestrian accidents

SafetyNet results

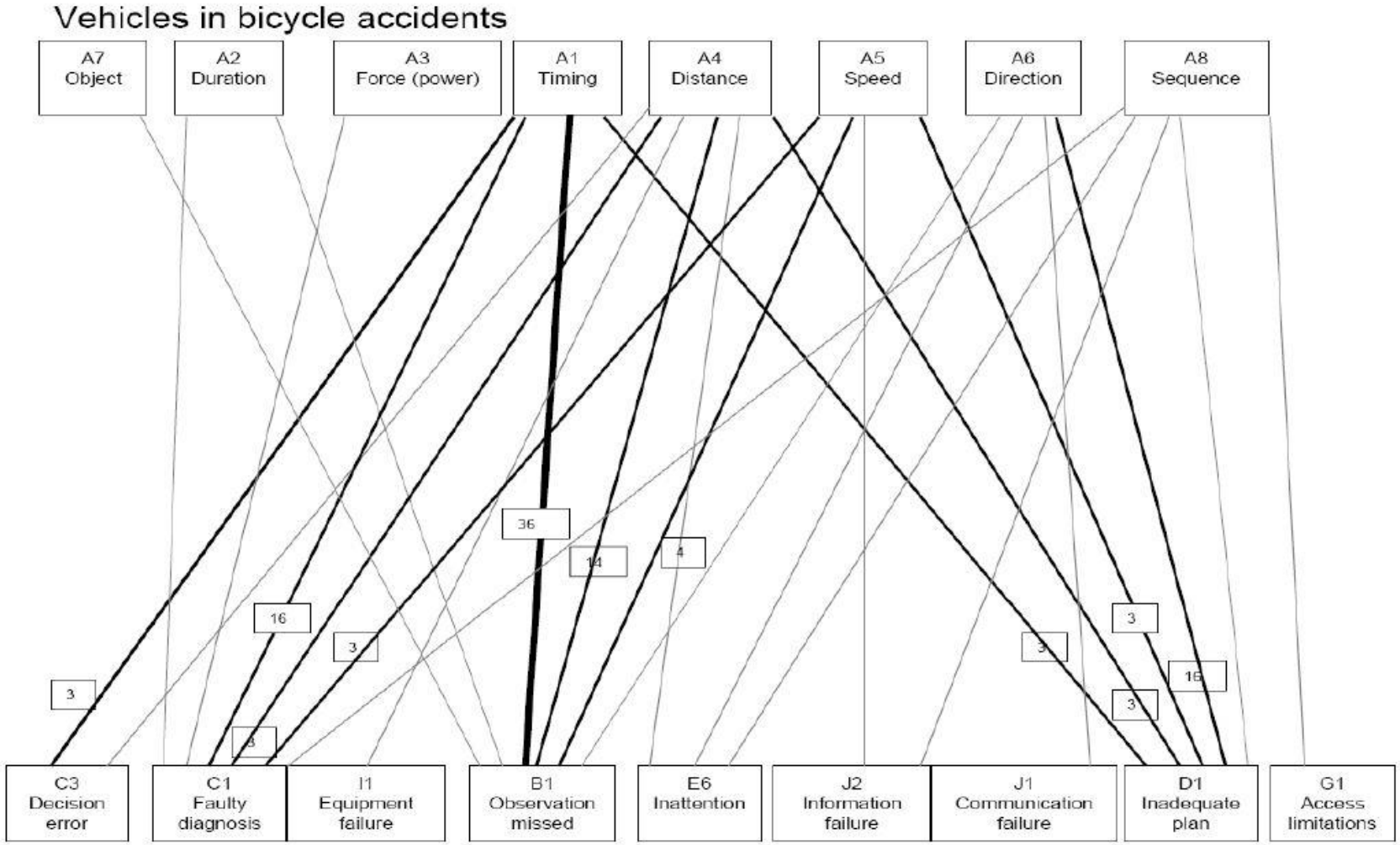

Figure 102, SNACS links from critical events to 1st level causes: vehicle drivers in bicycle accidents

Investigated fatal road traffic accidents 2010-2014

Pedestrians and bicyclists

- Fatalities
  - 94 pedestrians
  - 51 bicyclists
- Most fatally injured were elderly
  - Over 64-years 57 %
  - Few under 15-years old

Age of fatally injured (years)	Ped	bicycle	total
0-6	1	.	1
7-14	4	1	5
15-17	.	1	1
18-24	5	.	5
25-34	6	3	9
35-44	2	4	6
45-54	10	2	12
55-64	10	13	23
65-74	22	13	35
75 and over	34	14	48
total	94	51	145

Background risk factors

Background risk factors of drivers
Speeding
Relying on a familiar environment
Not paying attention to pedestrians and cyclists
Concentration on one's own activity
Too high speed for the situation
Darkness / Dazzling
Sight obstructions inside vehicle

Backfround risk factors of pedestrians / cyclists
Alcohol involvement
Relying on a familiar environment
Dark clothing
Concentration on one's own activity
Non use of bicycle helmet
Non use of refletors
Fit to drive (a bicycle)

Pedestrian and bicyclist accidents

Safety recommendations

- Emphasis on care and responsibility
- Vehicle technology (ESC, EBA, ISA, Collision avoidance systems)
- Raised pedestrian crossings
- Enhancing speed enforcement
- Installing traffic signals
- Promoting the use of bicycle helmets
- Increasing the use of reflective materials on clothing
- Development of airbags protecting vulnerable road users