

Pole Side Impact Accidents in Germany

(German In-Depth data analysis, GIDAS)

22/23th of March 2011, London DfT

Claus Pastor,

Section "Passive Vehicle Safety & Biomechanics"

Bundesanstalt für Straßenwesen

Objective

Support MUARC accident data analysis with German In-Depth data

KEY CASE SELECTION CRITERIA:

Side impact cases (CDC) – left or right

CDC damage profile:

- *D - DISTRIBUTED*
- *P - SIDE CENTRE, LEFT OR RIGHT*
- *Y = F+P*
- *Z = B+P*

Model year 2000 onwards (or ECE95 compliant)

Single impact

Collision partner: passenger vehicle or passenger vehicle derivative; pole/tree (narrow object)

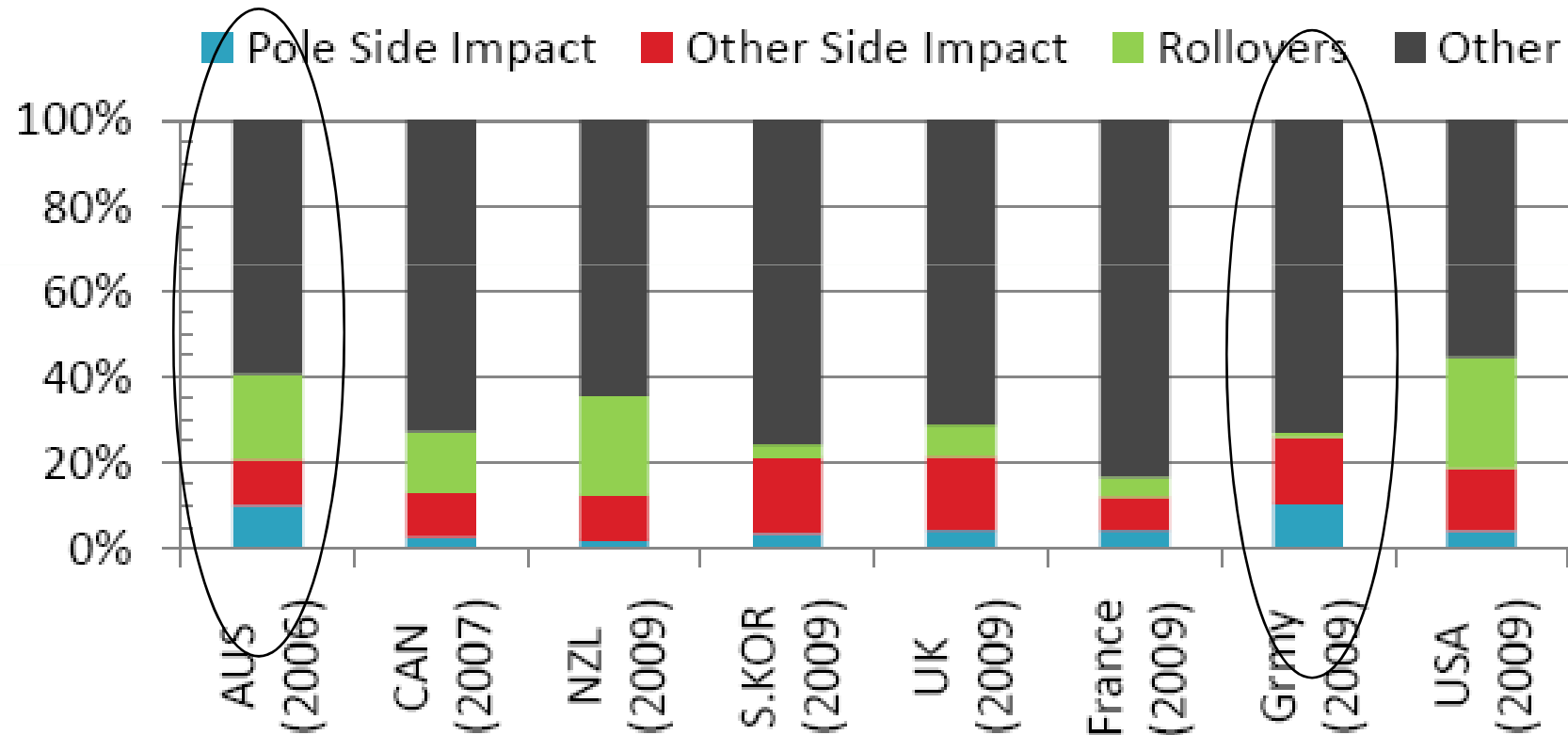
No rollover

No ejection

Occupants belted

Driver and front passenger occupants (excludes rear seat occupants, centre occupants)

Vehicle Side Impact & Rollover Fatalities as a percentage of total road toll



ANALYSIS TABLE 1: NUMBER OF POLE SIDE IMPACTS AND V2V IMPACTS – OCCUPANT CHARACTERISTICS

Characteristic	ALL INJURY SEVERITY		MAIS 2+		MAIS 3+	
	Vehicle (N=88)	Tree / Pole (N=15)	Vehicle (n=10)	Tree/pole (n=6)	Vehicle (n=3)	Tree/pole (n=4)
Position						
Driver	57 (65%)	12 (80%)	5 (50%)	4 (67%)	0	3 (75%)
Front left passenger	31 (35%)	3 (20%)	5 (50%)	2 (33%)	3 (100%)	1 (25%)
<i>Number of occupants</i>						
Age* (years)						
Mean (SD), years	45(17)	45(17)	51(19)	49(19)	57(16)	52(21)
Mean - 95th% CL	43-47	41-49	45-57	41-57	48-66	42-62
Median, years	44	47	54	54	56	54
Min/Max	18/80	18/78	22/80	20/78	38/78	20/78
Sex						
Female	55	7	7	3	3	1
Male	33	8	3	3	0	3

□

**No dominance of younger drivers for pole impacts in Germany
[compared to AUS]
However, likewise in AUS
Pole casualties tend to be male driver(s)**

Size und weight of passengers similarly distributed as in AUS

Side Airbag Fitment rate is still under consideration

No significant effects in injury risk modelling by now

Characteristic	ALL INJURY SEVERITY		MAIS 2+		MAIS 3+	
	Vehicle (N=88)	Tree / Pole (N=15)	Vehicle (N=10)	Tree / Pole (N=6)	Vehicle (N=3)	Tree / Pole (N=4)
Vehicle Class						
Small	40 (45%)	9 (60%)	4 (40%)	2 (33%)	0	1 (25%)
Medium	37 (42%)	6 (40%)	6 (60%)	4 (67%)	3 (100%)	3 (75%)
Large	4 (5%)	0	0	0	0	0
Unknown	7 (8%)	0	0	0	0	0
EBS						
Mean (SD) KM/H	18(9)	34(19)	27(11)	46(23)	37(16)	53(24)
Mean - 95th% CL	17-19	29-39	23-31	43-55	28-46	41-65
Median, KM/H	16	29	25	40	26	47
Min/Max	6/59	14/92	17/59	22/92	25/59	27/92

More small and medium cars in Germany, no large cars involved in pole/tree

Characteristic	ALL INJURY SEVERITY		MAIS 2+		MAIS 3+	
	Vehicle (N=88)	Tree / Pole (N=15)	Vehicle (N=10)	Tree / Pole (N=6)	Vehicle (N=3)	Tree / Pole (N=4)
Impact distribution						
D – DISTRIBUTED	0	0	0	0	0	0
P - SIDE CENTRE, left, right	36 (41%)	12 (80%)	2 (20%)	5 (83%)	0	3 (75%)
Y = F+P	31 (35%)	2 (13%)	6 (60%)	1 (17%)	2 (67%)	1 (25%)
Z =B+P	21 (24%)	1 (7%)	2 (20%)	0	1 (33%)	0
Crush - maximum						
Mean (SD) mm	69(114)	218(213)	223(199)	312(212)	377(239)	473(95)
Mean - 95th% CL	57-81	159-277	160-286	217-407	239-515	418-528
Median, mm	0	150	185	370	330	450
Min/Max	0/690	0/600	0/690	40/600	110/690	370/600

Distribution similar
Pole Impacts tend to be side centred

Showing higher crush depths

Characteristic	ALL INJURY SEVERITY		MAIS 2+		MAIS 3+	
	Vehicle (N=88)	Tree / Pole (N=15)	Vehicle (N=10)	Tree / Pole (N=6)	Vehicle (N=3)	Tree / Pole (N=4)
Speed limit (km/h)						
30/40	12 (14%)	0	2 (20%)	0	1 (33%)	0
50	62 (70%)	1	4 (40%)	0	0	0
60	1	1	0	0	0	0
70	6 (7%)	3 (20%)	2 (20%)	1 (25%)	2 (67%)	1 (25%)
80	1	1	0	1 (25%)	0	1 (25%)
90	-	-	-	-	-	-
100/110	5 (6%)	7 (47%)	2 (20%)	1 (25%)	0	2 (50%)
Other/no limit	1	2	0	1	0	0

**Distribution similar
it does reflect less severe accident distribution in GIDAS
(as compared to AUS In-Depth data)**

Modelling Injury Risk (Logistic Regression)

Head MAIS 2+

***Risk_SidePole > Risk_Veh2Veh
(Odds is roughly 5 times higher)***

Significance statement missing for Head MAIS 3+

Thorax MAIS 3+

***Risk_SidePole > Risk_Veh2Veh
(Odds are roughly 3 times higher)***

Significance statement missing for Thorax MAIS 2+

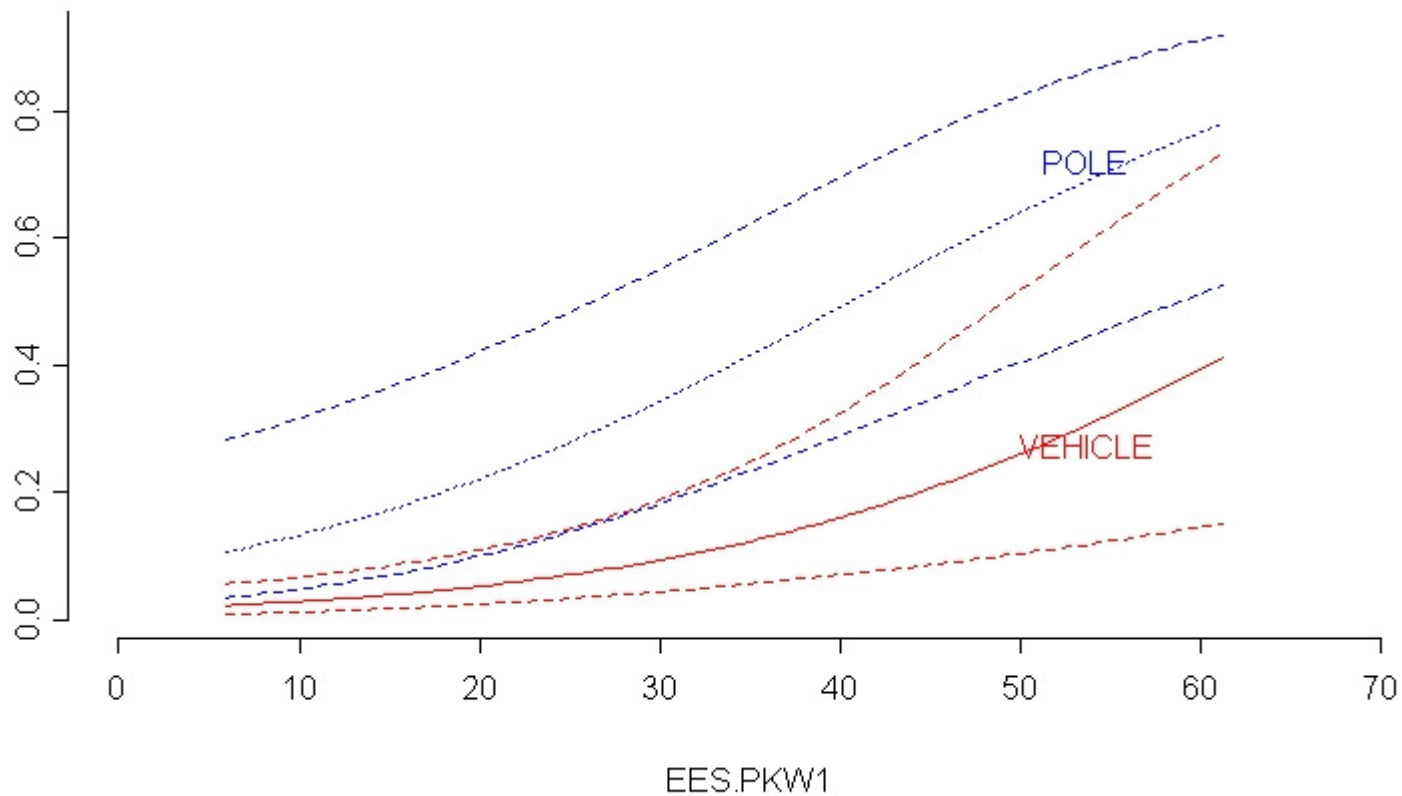
Pelvis MAIS 3+

Risk_SidePole > Risk_Veh2Veh

Pelvis MAIS 2+

Risk_Veh2Veh > Risk_SidePole

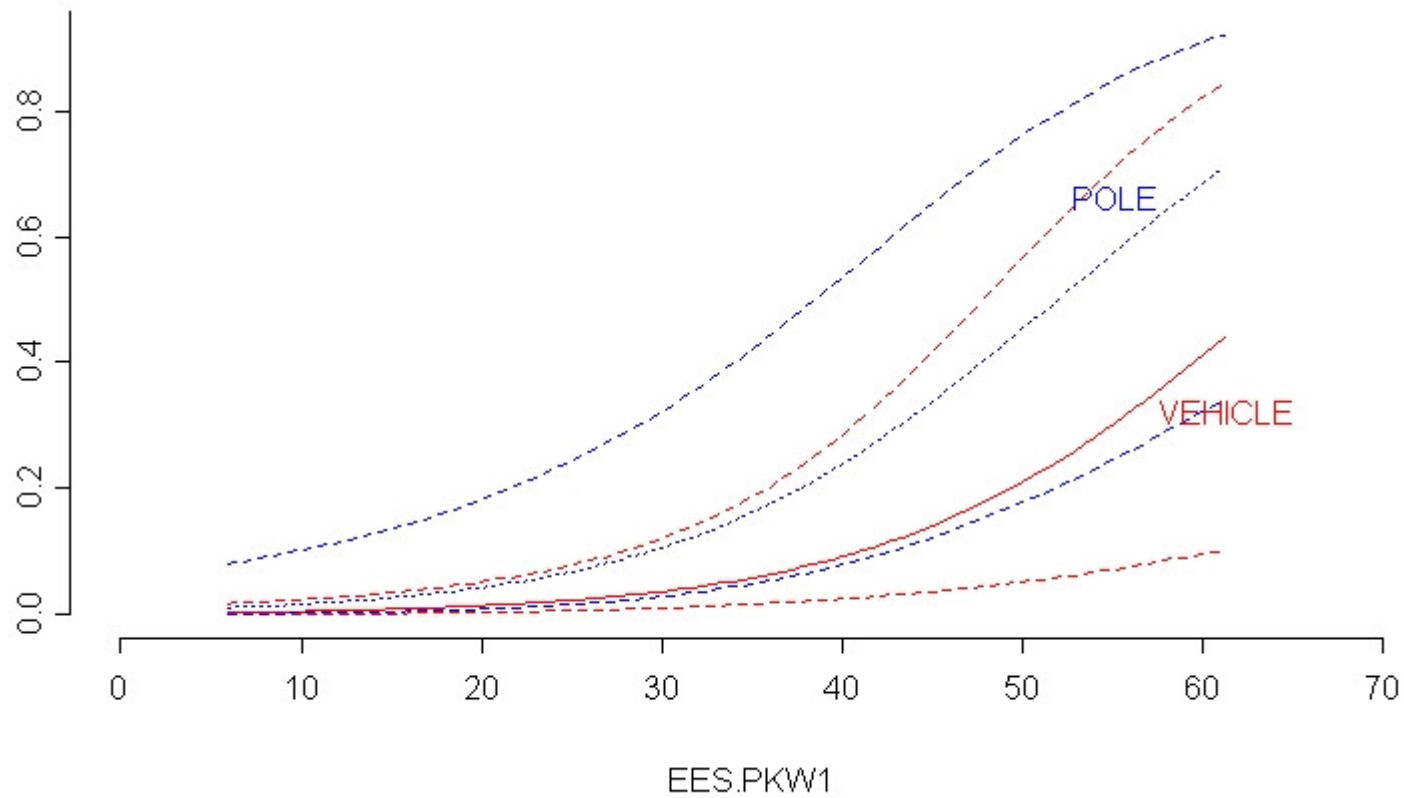
Prob of sustaining an AIS 2+ head injury in nearside impact with vehicles/poles



Adjusted to: AGE.1=new

Difference is significant at 0.95

Prob of sustaining an AIS 3+ head injury in nearside impact with vehicles/poles



Adjusted to: AGE.1=new

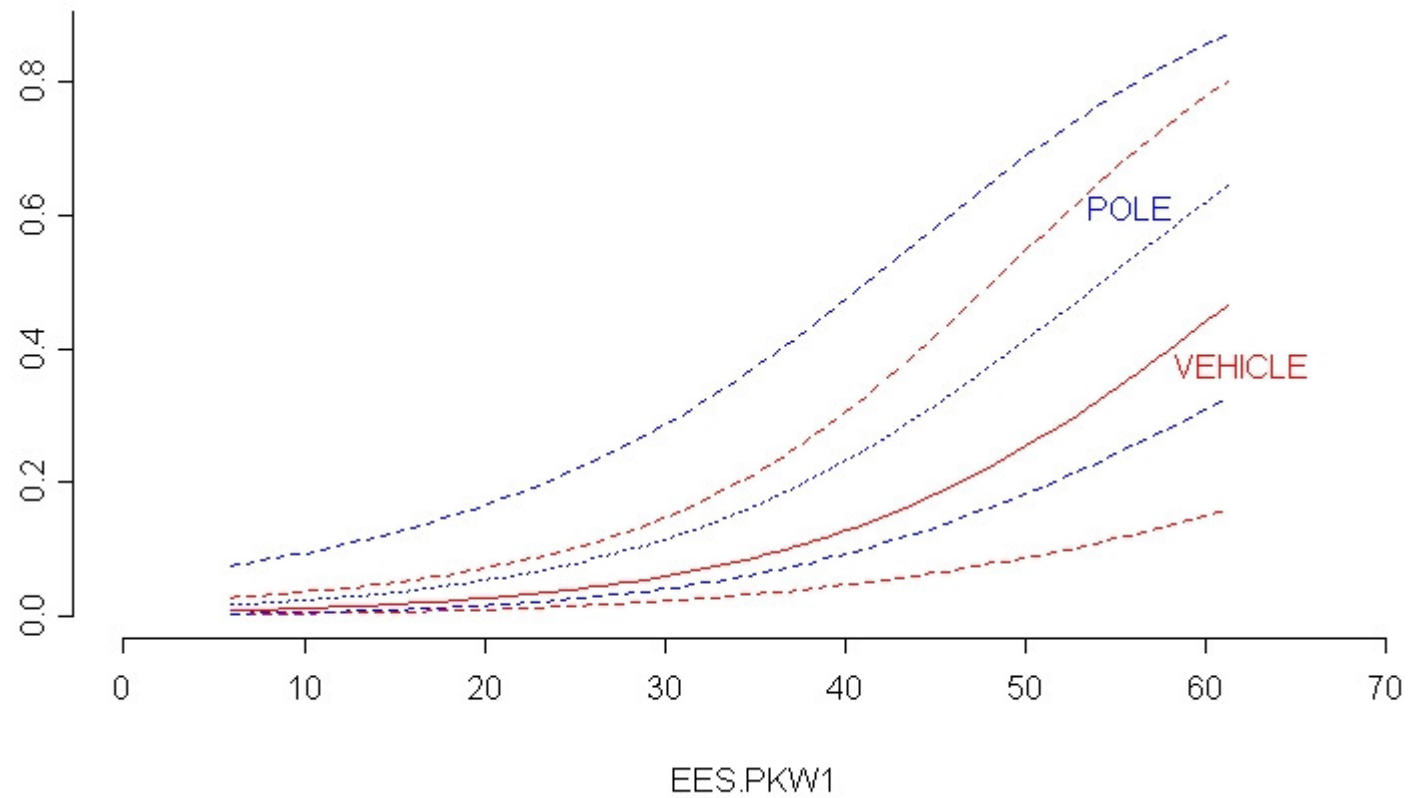
AIS 2+ to the head

	Coef	S.E.	Wald Z	P
Intercept	-4.39152	0.68794	-6.38	0.0000
POLE=POLE	1.61601	0.40473	3.99	0.0001
EES.PKW1	0.06107	0.01507	4.05	0.0001

AIS 3+ to the head

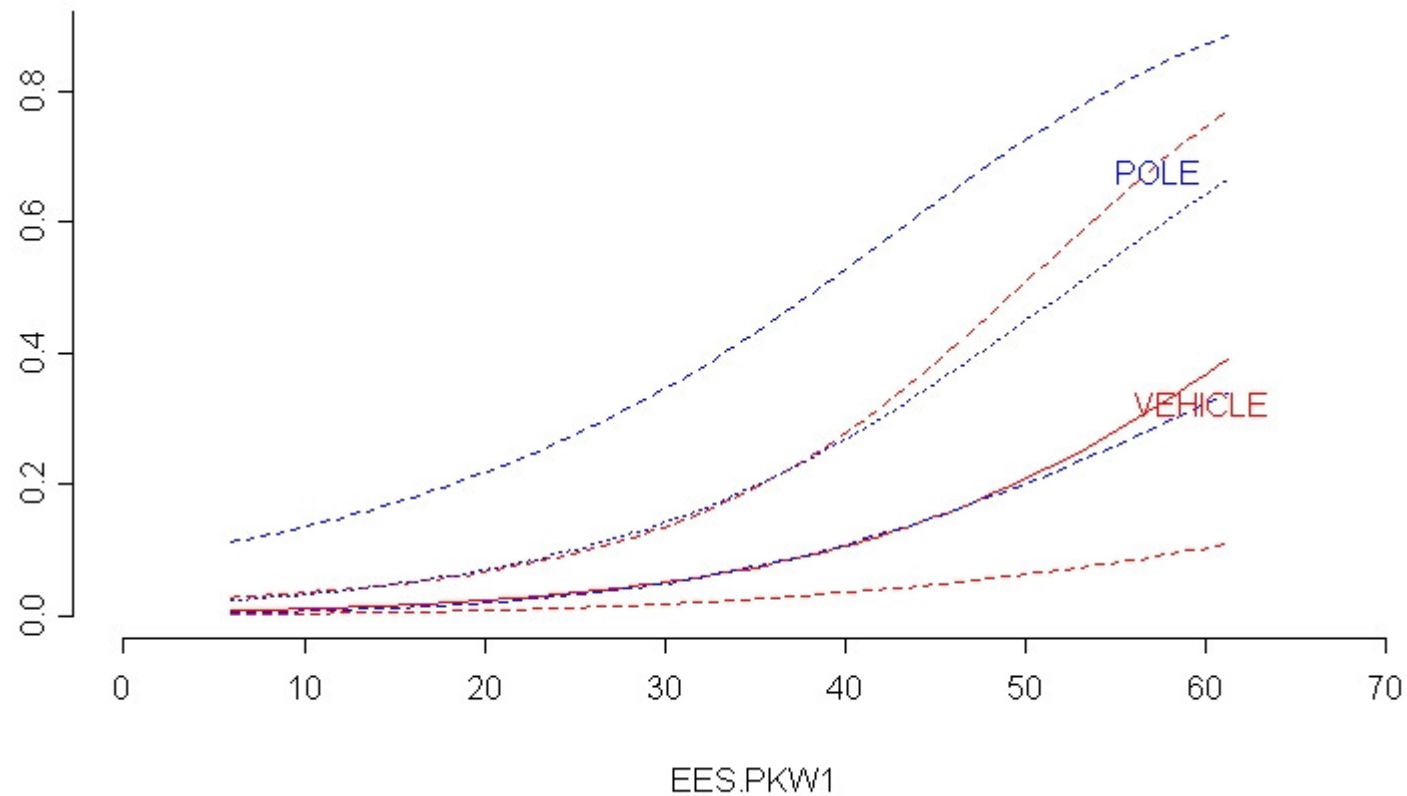
	Coef	S.E.	Wald Z	P
Intercept	-7.21923	1.32301	-5.46	0.0000
POLE=POLE	1.13217	0.73581	1.54	0.1239
EES.PKW1	0.09577	0.02221	4.36	0.0000

Prob of sustaining an AIS 2+ thorax injury in nearside impact with vehicles/poles



Adjusted to: AGE.1=new

Prob of sustaining an AIS 3+ thorax injury in nearside impact with vehicles/poles



Adjusted to: AGE.1=new

Difference is significant at 0.95

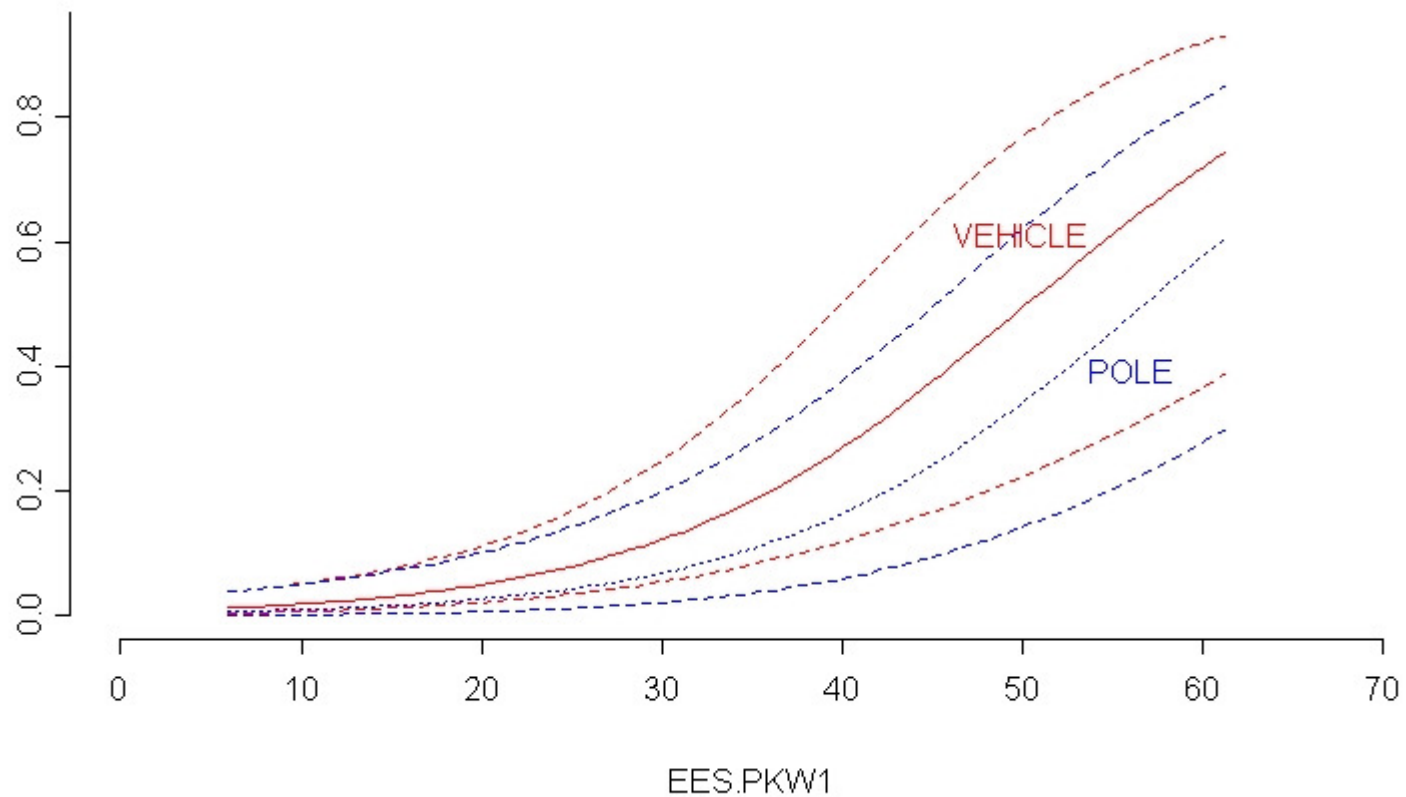
AIS 2+ to the thorax

	Coef	S.E.	Wald Z	P
Intercept	-4.38052	0.68198	-6.42	0.0000
POLE=POLE	0.72879	0.47259	1.54	0.1230
EES.PKW1	0.08431	0.01723	4.89	0.0000

AIS 3+ to the thorax

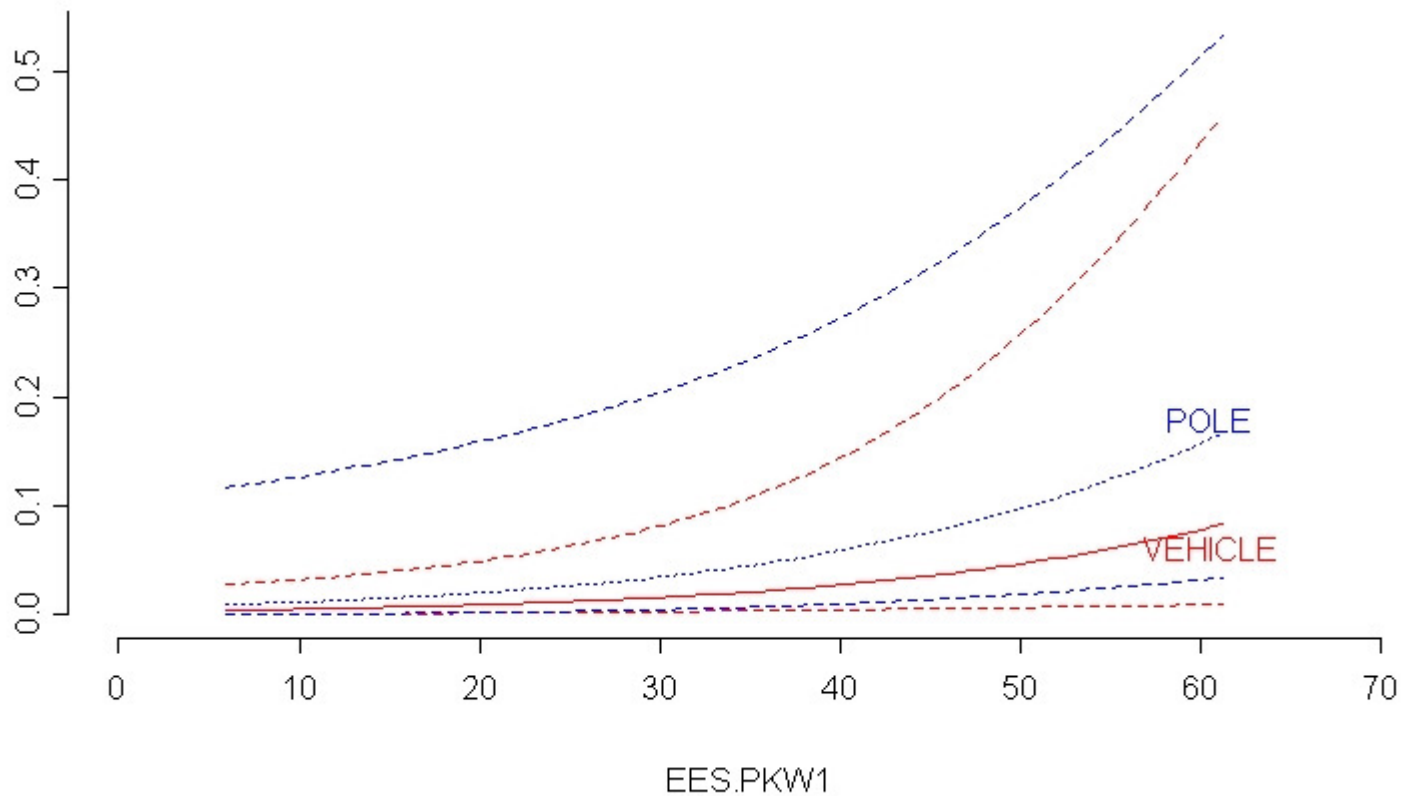
	Coef	S.E.	Wald Z	P
Intercept	-5.82223	0.97553	-5.97	0.0000
POLE=POLE	1.12966	0.56395	2.00	0.0452
EES.PKW1	0.07947	0.01840	4.32	0.0000

Prob of sustaining an AIS 2+ pelvis injury in nearside impact with vehicles/poles



Adjusted to: AGE.1=new

Prob of sustaining an AIS 3+ pelvis injury in nearside impact with vehicles/poles



Adjusted to: AGE.1=new

AIS 2+ to the pelvis

	Coef	S.E.	Wald Z	P
Intercept	-4.46876	0.69887	-6.39	0.0000
POLE=POLE	-0.63034	0.58396	-1.08	0.2804
EES.PKW1	0.09702	0.01793	5.41	0.0000

AIS 3+ to the pelvis

	Coef	S.E.	Wald Z	P
Intercept	-5.15701	1.04223	-4.95	0.0000
POLE=POLE	0.78751	0.96090	0.82	0.4125
EES.PKW1	0.05475	0.02155	2.54	0.0111

Modelling Injury Risk (Logistic Regression)

Head MAIS 2+

***Risk_SidePole > Risk_Veh2Veh
(Odds is roughly 5 times higher)***

Significance statement missing for Head MAIS 3+

Thorax MAIS 3+

***Risk_SidePole > Risk_Veh2Veh
(Odds are roughly 3 times higher)***

Significance statement missing for Thorax MAIS 2+

Pelvis MAIS 3+

Risk SidePole > Risk_Veh2Veh

Pelvis MAIS 2+

Rsik_Veh2Veh > Risk_SidePole

Less involvement of younger people in side pole impacts

Less heavy cars involved