Fact Sheet: FMCSA *Study of Truck Side Guards to Reduce Pedestrian Fatalities*

Bottom line: A flawed conclusion and inconsistent crash analysis cut the apparent VRU safety benefit of side guards by approximately *half*.

1. **Flawed conclusion about the effectiveness of side guards in 31% of crashes**
   - An inconsistent, flawed conclusion is repeated four times throughout the report, asserting that the literature shows side guards are ineffective at preventing VRU fatalities in crashes where the truck or trailer was turning. This is contradicted by a literature summary table in this same report (Table 12 on page 22, see image below) on the same page as one of these statements,[1] as well as by the conclusions of three cited sources that the report cites: Cookson 2010, Keigan 2009, and VanKampen 1999 (see screen shot).

Table 12. Effectiveness Estimates of LPDs in Collisions of VRUs with the Side of Large Trucks (studies from Australia, the Netherlands, and the UK).

Publication	Guard implementation	Crash set	Effectiveness (reduction in fatality or serious injury as a proportion of all injuries)
Rechnitzer, 1993	Not specified	All fatal crashes	20.0%
Rechnitzer, 1993	Not specified	All serious injury crashes	25.0%
VanKampen, 1999	Bus as proxy for low-clearance guard condition	All passenger side turning maneuvers (rail-style LPD)	25.0%
VanKampen, 1999	Bus as proxy for low-clearance guard condition	All passenger side turning maneuvers (smooth-style LPD)	35.0%
Riley, 1981	Not specified	Side impacts for motorcyclists, bicyclists, and pedestrians	24.0%

   - Cookson 2010 presents both an "ineffective in turning crashes" conclusion *and* the contradictory conclusion that they *are* effective in turning crashes. This study finds that **truck-bicycle left turn collisions in the UK were KSI (killed or seriously injured) in 25% when side guards were present, versus 67% KSI when side guards were absent.** The FMCSA report fails to acknowledge this conclusion of the Cookson 2010 study and thus misrepresents the study.
   - Keigan 2009, cited but never discussed by the report, concluded that **15 out of 16 forensically investigated *turning* truck crash bicyclist fatalities (93%) could have been prevented by either installed or improved side guards:**

[1] **"The literature review also indicated that LPDs are not effective in mitigating VRU fatalities and injuries in VRU collisions with the side of trucks when the truck is turning left or right."**

Table 4-5: Fatal injury interventions by collision type

Intervention	Collision Type, where N = number of collisions											
	A N=16	B N=11	C N=9	D N=6	E N=7	F N=5	G N=4	H N=3	I N=1	J N=0	O N=4	All N=66
B.2.2.2 - Cycle helmet use		3	5	3	6	1	3	2	1		2	26
B.3.1.1 - Speed enforcement			3									3
B.1.1.4 - Speed limit reduction			2		1							3
B.2.2.5 - Roadworthiness of bicycles		1										1
B.1.1.7 - Improve side guards on heavy goods vehicles	15	5										20

Finally, there were 20 cycle collisions where it was identified that if the heavy goods vehicle involved had had side guards fitted or they were more effective (typically covered a larger area), then they could have changed the pedal cyclist collision kinematics and subsequently prevented the fatal injuries. Collision types A (a heavy goods vehicle or a bus or coach turning left or changing lane to left struck the pedal cyclist) and B (Pedal cyclist lost control or wobbles or makes possible slight contact with the other vehicle) were associated with this intervention and the potential for benefit is believed to be significant. Side guards are not required to be fitted to all goods vehicles and there is a good argument that this should be reviewed given the lives that could potentially be saved.

- This conclusion is also contradicted by a Volpe Center VRU side guard crash demonstration involving pedestrian and bicyclist dummies, in which the truck executes a turn and the side guard pushes the bicyclist out of the wheel path, preventing a simulated probable fatality (**Pedestrian-Bike Side Guards for Trucks: How They Work**).
- **The effect of this flawed conclusion is to reduce the apparent safety benefit of the technology by 31%** (by 15 out of 48 relevant side guard-relevant fatalities), based on Tables 3-6 on pages 6-7.

2. Inconsistent crash analysis undercounted the relevant crashes by 10-20%

- A statistical inconsistency further diminished the apparent safety benefit by 10-20%: The FARS analysis of crashes by vehicle type and initial impact used **inconsistent numerators-denominators** that reduced the apparent percentages of LPD-relevant crashes as reported in Section 4.1 on page 23 of the published report[2]:

- The numerators *excluded* the Other/Unknown Initial Impact column in Tables 1 and 2 (page 4), whereas the denominators *included* the Other/Unknown Vehicles Type row.*
- The numerators *excluded* fatalities in multi-vehicle crashes, whereas the denominators *included* these.

[2] "Therefore, LPD technology may be relevant to about 0.3 percent of all pedestrian fatalities and 1.4 percent of all pedalcyclist fatalities in the US annually."

Table 1. Pedestrians Killed in Single-vehicle Crashes in 2017, by Vehicle Type Involved and Initial Point of Impact (2017 Fatality Analysis Reporting System).

Vehicle Type	Front Initial Impact No. (%)	Right Initial Impact No. (%)	Left Initial Impact No. (%)	Rear Initial Impact No. (%)	Other/ unknown Initial Impact No. (%)	Total No.
Passenger Car	2,009 (89.6%)	65 (2.9%)	40 (1.8%)	16 (0.7%)	113 (5.0%)	2,243
Light Truck	2,029 (88.6%)	58 (2.5%)	43 (1.9%)	31 (1.4%)	130 (5.7%)	2,291
Large Truck	206 (71.0%)	20 (6.9%)	7 (2.4%)	23 (7.9%)	34 (11.7%)	290
Bus	25 (75.8%)	2 (6.1%)	0 (0.0%)	0 (0.0%)	6 (18.2%)	33
Other/Unknown	260 (51.4%)	7 (1.4%)	5 (1.4%)	0 (0.0%)	234 (46.2%)	506
Total	4,529 (84.4%)	152 (2.8%)	95 (1.8%)	70 (1.3%)	517 (9.6%)	5,363

- Since they are aggregated, the Other/Unknown should either be consistently included (via reallocation in proportion to the known values) in both the numerator and the denominator of the crash percentage, or the Other/Unknown column and row should both be excluded.

Other facts:

- DOT entirely omitted from the report the benefit-cost analysis that was part of the side guard study scope, based on the FMCSA project webpage. The results of this censored analysis are relevant not only to LPDs but also to side underride guards.

- Shortly before the report was published (May 2020), the DOT Volpe Center side guard resource webpage and a crash test video were taken down. The website featured research findings and data that contradicted the definitive statements about ineffectiveness in the FMCSA report; these resources were restored in spring 2021.

Advocates' demand:

Now that the 2021 Bipartisan Infrastructure Law (BIL) has set a statutory one-year mandate for DOT to "complete a side underride guard research study and, if warranted, to develop performance standards," under Section 23011(c), **the published Lateral Protection Device (LPD) report should be remedied *immediately* to address the above inaccuracies and restore the omitted benefit-cost analysis before NHTSA can circularly cite it to undercut life-saving side underride guard regulations.**