'Pedestrian falls' as necessary addition to the current definition of traffic crashes for improved public health policies

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1. Introduction

Key to the development of public health policies and strategies is the accurate definition of the problem(s) under review. Accurate problem definition fences off undesirable circumstances, highlighting some aspects and throwing others in the shadow (Weiss, 1989). Widely accepted definitions of traffic crashes focus on vehicle crashes (sometimes further restricted to *motor* vehicle crashes) occurring on public roads. These definitions exclude incidents such as pedestrians slipping, tripping or colliding with objects resulting in falls in public spaces leading to injury or death. Such incidents are hereafter denoted in short as Pedestrian Falls (PFs)

The current definition is understandable from a historical perspective, but it may no longer be accurate or justifiable. The exclusion of PFs by definition and, subsequently, in statistics is likely to lead to biased conclusions in transport and safety policies, which do not serve public health interests. This paper focuses on the problem regarding definition only and not on reporting issues even though these are important as evidenced from frequently missing single-bicycle crashes (which, unlike PFs, are defined as traffic crashes in most countries) (Veisten et al., 2007).

The current definition of traffic crashes emerged in the early 20th century when motorisation led to increasing numbers of people losing their lives in motor vehicle crashes (Norman, 1962). As a consequence, traffic crashes were defined and measured as (motor) vehicle crashes. Indeed, Norman (1962) described that in the United States in 1957, deaths following motor vehicle crashes exceeded the combined deaths from all infectious and communicable diseases at all ages. The risk of pedestrian-motor vehicle crashes was particularly high, with pedestrian deaths following motor vehicle crashes in New York City in 1959 amounting to 70% of all officially recorded traffic crash deaths (Norman, 1962). It is likely that, compared to the number of official traffic crash deaths, the number of deaths following PFs was negligible. Nowadays, PFs no longer appear to be a negligible problem, especially in developed countries with their ageing populations as older people have a high risk of serious PFs. Currently in the Netherlands more elderly people are fatally injured from a pedestrian fall in public space than from pedestrian-vehicle collisions (Den Hertog et al., 2013).

2. Recent research on pedestrian falls

Although there have been very few, if any, official statistics of PFs until recent times, first studies show the size of the problem. According to Den Hertog et al. (2013) a little more than half of all pedestrian deaths and the vast majority of non-fatal pedestrian casualties in the Netherlands are now as a result of a PF. Table 1, which also includes data from Switzerland and Austria, shows that in the present-day road system, figures based on the current definition of traffic crashes do not provide a comprehensive overview of crash victims on public roads. Also, Mindell et al. (2015) found that of all pedestrian casualties hospitalised in England (2007-2009) with a

specified International Classification of Diseases (ICD) coding 23,528 were involved in a road traffic accident and 76,087 were injured in falls on the public highway, therefore the number of PF casualties were, similar to Dutch figures (Den Hertog et al., 2013), over three times greater than those involving a motorised vehicle. Both Den Hertog et al. and Furian et al. (2011) found that about three quarters of the PFs were related to bad or slippery pavement conditions, i.e. lack of 'walkability' as defined by how conducive, friendly and safe the urban environment is for walking (Abley, 2005). It is however beyond the aims of this paper to discuss the literature on walkability and factors having an impact on the level of walkability and related PFs.

Table 1 The Proportion of SP casualties on public roads in the Netherlands, Switzerland, and Austria.

	the Netherlands 2011(Den Hertog et al., 2013)		Switzerland 2011(BFU, 2014)		Austria 2009 Furian et al., 2011)	
	numbers	%	numbers	%	numbers	%
total number of injured road users	180,000	100	138,000	100	104,000	100
Injured pedestrians	48,000	27	56,700	41	36,500	35
of which traffic crash	5,000	3	2,400	2	4,000	4
of which PFs	43,000	24	55,300	40	32,500	31
total number of hospitalised road users	41,000	100	n.a.	n.a.	n.a.	n.a.
hospitalised pedestrians	11,000	27	n.a.	n.a.	n.a.	n.a.
of which traffic crash	2,000	5	n.a.	n.a.	n.a.	n.a.
of which PFs	8,600	21	n.a.	n.a.	n.a.	n.a.
Total number of fatalities	747	100	n.a.	n.a.	n.a.	n.a.
pedestrian fatalities	160	21	n.a.	n.a.	n.a.	n.a.
of which traffic crash	74	10	n.a.	n.a.	n.a.	n.a.
of which PFs	86	12	n.a.	n.a.	n.a.	n.a.

Probably owing to definitional bias and lack of accessible data, only a few researchers with a transport and walkability focus (Den Hertog et al., 2013; Furian et al., 2011; Methorst & Schepers, 2010; Öberg, 2011; Mindell et al., 2015, Oxley et al. 2016) have started to estimate the size of the PF problem; however, most research into pedestrian injury/death incidents, is still restricted to pedestrian-motor vehicle crashes (Elvik et al., 2009). By contrast, the problem of falls is well recognized among researchers in the field of epidemiology. The World Health Organisation estimates that globally approximately 37.3 million falls occur each year that are severe enough to require medical attention, with an estimated 424,000 falls occurring that result in fatal injuries (WHO 2014). This is the second leading cause of unintentional injury death (WHO 2014).

Unfortunately for transport- and public space related researchers, these figures also include falls indoors and in private gardens. As most studies on falls and interventions by epidemiologists combine all falls regardless of location, the

outcomes are of limited use for road and public space authorities. It is, however, positive that some researchers recently have started to at least distinguish between indoor and outdoor falls (Kelsey et al. 2010).

3. Consequences of excluding pedestrian falls

The exclusion of PFs from transport research is likely to lead to biased conclusions about the link between road safety and the design of our road transport system. Elvik et al. (2009) described an interesting example based on Norwegian research. The risk of injuries (injuries per kilometre travelled) for car occupants is two times higher than that for bus passengers. This suggests that the number of injuries decreases when people shift from driving to using buses or trains. However, this conclusion only appears to apply to injuries falling within the official definition of road traffic crashes (excluding PFs). According to Elvik et al. (2009: 1064), “The unrecorded injuries from falls will, however, increase so much that no overall gain in safety can be expected if car users start using buses or trains.”

Similarly, it is difficult to rule out the possibility that results from studies on pedestrian crossings are biased by the restriction of research to motor vehicle crashes (Elvik et al., 2009). Nyman et al. (2013) recently found that PFs occurred most frequently while pedestrians were crossing a road. As Den Hertog et al. (2013) suggested, the large majority of non-fatal pedestrian casualties are PF victims. This may also be applicable to pedestrian crossings. This means that walkability factors such as differing kerb heights may have a similar or greater significance on overall safety outcomes than factors relevant to pedestrian-motor vehicle crashes.

We expect that the number of severe pedestrian injuries in motor vehicle crashes in developed countries will further decrease in the future. More speed-reducing measures and new mechanical systems such as automated braking and pedestrian airbags on car bonnets have the potential to reduce the risk of fatalities and the severity of pedestrian-motor vehicle crashes. However, our ageing population means that without the introduction of new public health and road safety policies severe injuries from PFs are likely to increase. This increase and related mobility and reduced physical activity problems among the elderly are unacceptable from the perspective of public health. If we are to address the problem of PFs, the first thing we have to do is agree on a comprehensive definition of incidents that include PFs on an equal basis besides traffic crashes.

4. Discussion

We recommend to consider changing the definition (for instance in the International Classification of Diseases) to the following: “any vehicle crash and pedestrian fall occurring ~~on~~ in ~~the~~ public ~~road~~ spaces.” For the same reasons of usability by authorities we recommend to broaden public roads to public spaces. The inclusion of PFs in the definition would lay the basis for the collection of more comprehensive data on injuries on public roads and in public spaces. This would inform more accurate research and analysis of traffic risks and lead to better input and guidance for road authorities, urban planners, and public health authorities, to enable them to design inclusive and safe public spaces, improve walkability and thereby helping the elderly to stay mobile, independent and (physically) active.

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References

Abley, S., 2005. Walkability scoping paper. http://www.levelofservice.com/walkability-research.pdf (accessed 20-12-2016).

BFU, 2014. STATUS 2014: Statistics on Non-occupational Accidents and the Level of Safety in Switzerland, Road traffic, Sports, Home and Leisure. BFU – Swiss Council for Accident Prevention, Berne.

Den Hertog, P., Draisma, C., Kemler, E., et al., 2013. Ongevallen bij ouderen tijdens verplaatsingen buitenshuis (Accidents with seniors during outdoors trips). VeiligheidNL, Amsterdam.

Elvik, R., Høye, A., Vaa, T., et al., 2009. The Handbook of Road Safety Measures. Emerald, Bingley.

Furian, G., Kühnelt-Leiddihn, A., Bauer, R., 2011. Das Unfallrisiko auf Fußwegen in Österreich. KFV Östereichischer Verkehrssicherheitsfonds, Vienna.

Kelsey, J.L., Berry, S.D., Procter-Gray, E., et al., 2010. Indoor and outdoor falls in older adults are different: the maintenance of balance, independent living, intellect, and Zest in the Elderly of Boston Study. J Am Geriatr Soc. 2010 Nov;58(11):2135-41. doi: 10.1111/j.1532-5415.2010.03062.x PMID: 20831726.

Methorst. R., Schepers, P., 2010. Letselongevallen van Voetgangers en Fietsers (Injury Accidents of Pedestrians and Cyclists). Rijkswaterstaat, Delft.

Mindell, J.S., Leslie, D., Wardlaw, M., 2015. Exposure-Based, 'Like-for-Like' Assessment of Road Safety by Travel Mode Using Routine Health Data. PLOS, http://dx.doi.org/10.1371/journal.pone.0050606

Norman, L., 1962. Road Traffic Accidents: Epidemiology, Control, and Prevention. World Health Organization, Geneva.

Nyman, S., Ballinger, C., Phillips, J., et al., 2013. Characteristics of outdoor falls among older people: A qualitative study. BMC Geriatr. 2013 Nov;13:125. doi: 10.1186/1471-2318-13-125 PMID: 24245830

Öberg, G., 2011. Skadada fotgängare (Injured Pedestrians). VTI, Linköping.

Oxley, J., O'Hern, S., Burtt, D., Rossiter, B., 2016. Fall-Related Injuries While Walking in Victora, Victoria Walks, Melbourne.

Veisten, K., Saelensminde, K., Alvaer, K., et al., 2007. Total costs of bicycle injuries in Norway: correcting injury figures and indicating data needs. Accid Anal Prev. 2007 Nov;39(6):1162-9. doi: 10.1016/j.aap.2007.03.002 PMID: 17920839.

Weiss, J. 1989. The powers of problem definition: The case of government paperwork. Policy Sciences. 1989 May;22(2):97-121. doi: 10.1007/BF00141381.

WHO, 2014. Falls (Fact sheet no 344) World Health Organisation, Geneva.

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