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The use of space by girls and boys: lessons from traffic accidents

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Introduction

Girls are less at risk in traffic than boys, in many countries. This article presents some examples of differential accident involvement of girls and boys, 0-19 years old, actively participating in traffic. Explanations for these differences are sought in the way girls and boys use public space, and in the meaning traffic has for them.

A first remark concerns the problem of gathering data on differences between boys and girls, of different age groups, for different modes of transport, related to different exposure data. When data exist, and that is seldom the case, and are used in publications, they are hidden in percentages, ratios and figures. Therefore, comparisons are difficult to make.

Casualties

Table 1 presents Dutch figures on pedestrian and bicycle casualties. 185 Girls, 0-19 years of age, were killed, from 1989 to 1993, 2854 were treated in a hospital, and 10005 were slightly injured. The figures for boys are: 298, 4404, and 11805. In other words: 39% of all serious victims are girls, 61% boys. The difference between slightly injured girls and boys is smaller.

	Girls		Boys		Total	
	N	%	N	%	N	%
Killed	185	38%	298	62%	483	100%
Seriously I.	2854	39%	4404	61%	7258	100%
Slightly I.	10005	46%	11805	54%	21810	100%

Table 1. *Killed, Seriously Injured (Seriously I.: hospital), and slightly injured (Slightly I.) girls and boys (0-19): pedestrians and bicyclists together, 1989-1993.*

Comparable figures are found in Britain and Germany.

Boys experience more serious pedestrian and cycle accidents than girls in Britain. Twice as many boys as girls are involved (Avery and Jackson, 1993).

Thirty two per cent of 0-18 year old traffic victims (passengers included) were girls, in West Germany in 1982 (Wittenberg et al., 1987).

An explanation for differences in traffic accidents between girls and boys can be sought in a difference in their use of public space, but also in factors related to biological or psychological differences, factors possibly underlying the use of space.

Differential use of space

When exposure of girls to traffic differs from the exposure of boys, differences in accidents could be expected, especially when independent mobility is concerned. It could also be that boys use more dangerous modes of travel.

Traffic participation

The amount of use of public space is sometimes measured in number of journeys or number of activities outside home, sometimes in time in the roads, sometimes in distance travelled. Data on distance travelled, comparing girls and boys, are only available for walking.

Number of journeys

Some studies (Hillman et al., 1990; Wittenberg et al., 1987; Van der Spek and Noyon, 1993), which give data related to number of journeys and activities, compared girls and boys. The Dutch survey (Van der Spek and Noyon) found no differences between girls and boys in number of activities outside the home. The German study (Wittenberg et al.) also found no difference in number of journeys for the 3-17-year-old age group. Hillman et al., making use of the British National Travel Survey, report that girls in all age groups (7-14) have the same or a higher number of journeys than boys. The journeys concern trips to school, shops and leisure activities.

Time in the street

Some studies, however, report a difference in time in the streets, probably reflecting a difference in time spent playing in the street or a difference in distance travelled per journey. Van An del, in a Dutch study (1985), observed the number of girls and boys at different locations and found that 35% of the children were girls. This result contrasts with other data. Hooghiemstra (1995) concludes that Dutch girls and boys spend almost the same amount of time outside the home.

In an Australian study (Drummond and Ozanne-Smith, 1991), exposure data were collected through an observational survey conducted at 80 randomly selected zones across metropolitan Melbourne. Data were collected on both the quantity (time) and quality (various behaviours) of child pedestrian and bicyclist exposure. The total of child pedestrians observed was 3342. There was a virtually even male/female split in the sample.

Distance walked

An observational study (Ward et al., 1994) in Northampton (UK), where pedestrians were observed, followed and interviewed, distances of walking were established, and metres walked along the road, and number of streets crossed. Females are estimated to walk an average of 844 metres on an average day compared with an average for males of 786 metres. Boys aged 5-15 walk on average about 1150 metres, which is about 40% further per person than girls, but for the older teenagers (16-19 years of age) the pattern is reversed with girls walking 1914 metres, which is 21% further per person than boys. It can be estimated from these figures that the distance walked by boys, aged 5-19, is 55% of all metres walked by both sexes. This study related this distance to the accident involvement of boys and girls. The conclusion of the authors is that boys aged 5-15 are about one and a half times more at risk of being injured as pedestrians than girls. When

exposure is taken into account they find that boys and girls in the 5-9-year-old age group have very similar casualty rates per kilometre walked, but boys are one and a half times more likely to be injured when crossing the road. Girls (10-15 years of age) appear to be less able than boys either to walk alongside or to cross the road safely. Girls of this age have the highest casualty rates of any age group for both kilometres walked alongside traffic and for roads crossed. The increase in ability of females in late teenage years to keep themselves safe from injury as pedestrians is even more marked than for males of the same age.

Conclusion

An unequivocal conclusion cannot be drawn from these exposure studies. Differences between accident involvement sometimes are related to differences in exposure. Mostly boys are more at risk. But an interaction between gender, age and traffic task is probable. Detection of these interactions is only possible in detailed observation studies, like the last one in Northampton.

Modes of travelling

Could it be that girls use safer modes of travelling?

Cycling and walking

Bicycle accidents start at an early age. Do we find differential use of bicycles by girls and boys reflected in differential accidents?

Girls and boys differ in their *ownership* of bicycles, but the differences are small. No difference is found in Dutch children. Nearly all children older than five possess a bicycle. The British data only report a difference between senior children (11-15 years old), 69% of the girls owning a cycle in contrast to 84% of the boys. 93% Of the German junior and senior boys own bicycles, in contrast to respectively 84% and 88% of the girls.

The Dutch study presents no evidence of gender-differences in the *use* of bicycles for visiting clubs or friends and the school journey.

Some British differences in possession are reflected in differences in the use of bicycles for the school journey: 1 to 7% of the different groups of boys ride to school, and 0 to 4% of the girls. But the use of bicycles and the differences between girls and boys are so small that we hardly could expect this to be a cause of different accident involvement. Wittenberg et al. (1987) report that the 1975-difference between girls and boys in the use of bicycles for the school journey has disappeared in 1984. This study, however, reports a considerable difference in the use of bicycles when all journeys are considered. Girls make 19.4% of their trips by bicycle, in contrast to 26.2% of the boys. The authors conclude that boys choose more often for dangerous modes of transport (bicycles and mopeds) than girls, in a ratio of 3 to 2. I do not know whether this difference still exists in Germany. The Australian study (Drummond, 1991) observes that the majority (85%) of the 3709 cycling children in the Australian survey were boys.

The difference in *accident involvement* of girls and boys is smaller when bicycles are concerned than when the victims are pedestrians, as can be seen in table 2. It could be that the danger of bicycling is more dependent on other road users than the danger of walking, what is more dependent on own initiative.

	Girls		Boys		Total	
	N	%	N	%	N	%
<u>Pedestrians</u>						
Killed	50	34%	98	66%	148	100%
Seriously I.	833	33%	1729	67%	2562	100%
Slightly I.	2146	42%	3001	58%	5147	100%
<u>Bicyclists</u>						
Killed	135	40%	200	60%	335	100%
Seriously I.	2021	43%	2675	57%	4696	100%
Slightly I.	7859	47%	8804	53%	16663	100%

Table 2. Killed, Seriously Injured (Seriously I.: hospital), and slightly injured (Slightly I.) girls and boys (0-19): pedestrians and bicyclists separately, 1989-1993.

Swiss figures (Hubacher, 1994), based on a sample of seriously injured children (age: 1-16), show the same pattern. Of the pedestrian victims 28.5% are girls, of the cycling victims 40%. Nothing, however, is mentioned about the use of bicycles.

Wittenberg et al. (1987) report the general trend in accident involvement (1983): a large difference between girls and boys: 33% of all victims in the 0-17 age group are girls. But my estimate for 1983, drawn from their Tabelle 13 and Abbildung 18, are as follows: 30% of killed and injured bicycle victims are girls, and 51% of pedestrian victims are girls. This is an indication that the earlier mentioned difference in use of bicycles in Germany is reflected in accident involvement. Boys are more at risk because of their dangerous choice of transport mode.

With exception of these German figures, the large difference in accident involvement between girls and boys is shown in many countries, also when pedestrians are involved. Rates of pedestrian death and serious injuries are also about twice as high in boys as in girls in the USA (Wilson et al., 1991).

Mopeds

Many Dutch boys start riding mopeds at the age of 16, or even younger, but then without license. Moped riding is very dangerous, and this is reflected in the accident figures of the 15-18-year age group. The chance of being killed as a moped rider for this group is 17 times greater than being killed as a car driver for all age groups.

Of the boys in this group 4.3% possess a moped, in contrast to 1.8% of the girls. This fits the average number of moped trips made per day. Boys: 0.5; girls: 0.2 (CBS, 1992).

Eighty seven moped riders were killed in the Netherlands in 1993. Forty of them were in the 15-17-year old age group, of which 23% were girls.

German boys (3-17 year old) make 5.6% of their trips by moped, in contrast to 1.4% of the girls (Wittenberg et al., 1987).

An estimated 68% of all moped victims were boys (drawn from Tabelle 13 and Abbildung 18).

As far as moped drivers are concerned, gender-differences in accidents are clearly caused by a dangerous mode of transport.

The conclusion can be that part of the differential accident involvement could be attributed to differences in choice of traffic mode. This certainly concerns the use of mopeds, and perhaps the use of bicycles. But this cannot explain the differential accident involvement of pedestrians found in many countries.

Independent mobility

The question is whether girls are more restricted in independent travelling than boys. In some countries girls are more restricted in traffic than boys. In the UK 26% of girls travel from primary school home alone, compared with 44% of boys (Hillman et al., 1993). More boys than girls of junior school age are allowed to cross roads on their own, to go to leisure activities, to cycle on roads, to use public transport and to go out after dark. These differences have not been found in Germany and the Netherlands. But German parents are also much more permissive regarding their boys going out after dark.

Supervision alone is not enough to prevent accidents. Some studies show that children's accidents in many cases happen when an adult or a supervisory older child is present. Avery and Jackson (1993) report that one third of all pedestrian accidents happen when an adult or a supervisory older child is present.

Lawson, analysing 51 young (aged 0-19) pedestrian fatalities in Birmingham, mentions that ten children were accompanied by parents or other adults. Of the thirty 0-9 years olds eight were accompanied by parents or other adults.

Conclusion

The contribution of difference in amount of time, number of trips or distance travelled in public space to the difference in accident involvement of girls and boys is small, absent or unknown. Differences in mode of travelling and independent mobility both contribute to this difference. But the large difference in pedestrian accidents, and the fact that many pedestrian accidents also occur when the child is accompanied, suggest still other explanations.

Biological and psychological differences

Differences are not only found in traffic accidents. Girls are less involved in nearly all kinds of accidents, with the exception of horse-riding accidents!

Some examples:

Kingma (1994) gives data on patients who attended the emergency room at the University Hospital Groningen, The Netherlands, during the period 1970 through 1993. The gender distribution per age group was studied for 246,277 trauma patients. Nine categories of accidents were distinguished: traffic, accident fall, falling object, cutting and piercing instrument, machinery, sport and unspecified, self-inflicted injury and suicide attempt, violence, other. Of all patients 36% were female. 41% Of the 0-9 year olds, and 36% of

the 10-19 year olds were girls. The largest difference is found in the 20-39-year old age group. 27% to 28% of the patients were female. From the age of 60 the percentage of female patients was higher than those for men.

Of all victims of accidents in the 0-4-year-old age group and in the 5-19-year-old age group, treated in a sample of hospitals in the Netherlands, 43% were girls (PORS, 1990). A comparable sample in Switzerland (Hubacher, 1994) resulted in 41.4% girls (age group 1-16). It is remarkable that only 5.6% were traffic accidents! Leisure time and play accidents are responsible for 59%, sport for 30%, homework accidents for 5% of all accidents.

Of all 0-14 year old fatal victims in England and Wales in 1987 243 (36%) were girls, 444 (64%) boys (estimation based on figure 2.1: Avery and Jackson, 1993).

An explanation can be sought in differences in vulnerability, in differences in skills of handling the space and objects in space, or in differences in risk taking.

Vulnerability

Table 1 can be rearranged so that the differences in vulnerability are made clear (Table 3). When girls are involved in an accident, 1.4% are fatal, 21.9% serious, and 76.7% not serious. For boys the percentages respectively are 1.8%, 26.7% and 71.5%. This could mean that the outcome of accidents is less serious with girls than with boys.

	Girls		Boys		Total
	N	%	N	%	N
Killed	185	1.4%	298	1.8%	483
Seriously I.	2854	21.9%	4404	26.7%	7258
Slightly I.	10005	76.7%	11805	71.5%	21810
Total	13044	100%	16507	100%	29551

Table 3. *Killed, Seriously Injured (Seriously I.: hospital), and slightly injured (Slightly I.) girls and boys (0-19): pedestrians and bicyclists together, 1989-1993.*

The Swiss data (Hubacher, 1994) report also heavier injuries in boys than girls. E.g. the large proportion of nerve and spinal cord injuries are found in boys: 87%. This also suggests greater vulnerability.

However, it could also mean that girls avoid extreme situations relatively more often than boys.

Skills and abilities

Girls are ahead of boys in development in many respects. E.g. the intellectual development is faster, and higher intelligence is related to less accidents.

Avery and Jackson (1993) state that girls score better in reaction time. This has been measured on computer-simulated road crossings and girls have been consistently better than boys with the more complex tests.

Risk taking

Jaworowski (1992) states that certain personality and behaviour characteristics have been associated with children involved in accidental injury, namely: aggression, overactivity and impulsiveness.

Many studies relate the higher accident involvement of boys to their higher level of physical activity and aggressiveness. Avery and Jackson (1993), referring to observation studies, describe differences in behaviour. Boys, walking in the street, tend to act in a more reckless, impulsive and adventurous way than girls. They are more likely to dash ahead or loiter behind at critical times when a road is to be crossed, than do girls.

Overall, girls exercise more care and attention themselves near the road, and also are more likely to stay close to their parent or carer. In crossing, girls are more likely to stop on the kerb and look up and down the road before crossing, boys tend to look more as they approach the kerb and whilst crossing.

Boys adopt adult-like strategies for crossing roads earlier than girls do, without having the necessary abilities.

This picture contains two elements: differences in activity and impulsiveness, but also a difference in autonomy.

Women are less attracted to risk taking than men (Parker et al. 1992a and b). They evaluate outcomes of traffic violations as more negative and report to have more control over committing violations, are more afraid of having an accident, perceive traffic situations as more risky (Tränkle et al., 1990), judge their driving skill less optimistic (DeJoy, 1992), report less risky behaviour (Barjonet, 1992), etcetera. One of the consequences is that they avoid dangerous traffic situations to a larger degree than men. Some would say that this is caused by a biologically based personality factor, e.g. "Sensation Seeking": the need to participate in exciting activities (Zuckerman, 1985). Others would say that differences are the result of socialization. Boys are stimulated to be independent, to take initiatives.

Concluding remarks

The differential need for excitement and autonomy together could explain differential use of space, in quantity, but also in quality, and this could explain the differential outcome in accidents.

Two developments, among other things, could change the differential use of space by boys and girls: the meaning of traffic participation, and gender emancipation.

The case of bicycles can illustrate the first. Dutch girls and boys use bicycles in a similar way. We could explain that by taking into account the meaning bicycles have in the Netherlands. Bicycles do not have the image of 'sporty', and 'risky'. They are a normal mode of transport, not appealing to attributes as daring and exciting. Mopeds do have these characteristics in the Netherlands. In some other countries bicycles probably are used to fulfil the need of seeking sensations. Then greater differences in use, and in accidents, can be expected between boys and girls. When the meaning changes, remaining differences can be attributed to the level of activity and autonomy.

Gender emancipation, increased involvement of women in society, could decrease their more careful use of space. A first indication is found in a UK study. Young female drivers drive faster than all other drivers, when they are alone (Parker, 1994). So, the inevitable emancipation will diminish the differences caused by socialisation. On the other hand, mass media still offer a traffic world full of risks, and populated by men taking them. There still applies: traffic is toys for the boys.

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