New insights in the behaviour of senior cyclists

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Why research on behaviour of older cyclists?

Pros of cycling:

Regular physical exercise keeps healthy

WHO recommendation for adults: at least 30 minutes of physical actictivity at least 3 days/week, better 7 days/week

but: only 10% of older persons in Germany have enough exercise

Cycling might a good means to be physically active

Cons of cycling:

In Germany in every second fatal cyclist accident the cyclist is 65 years or older - many more than expected from exposure

Are there differences between older cyclists with and without accident?

How do physical difficulties which become more frequent with age contribute to accidents?
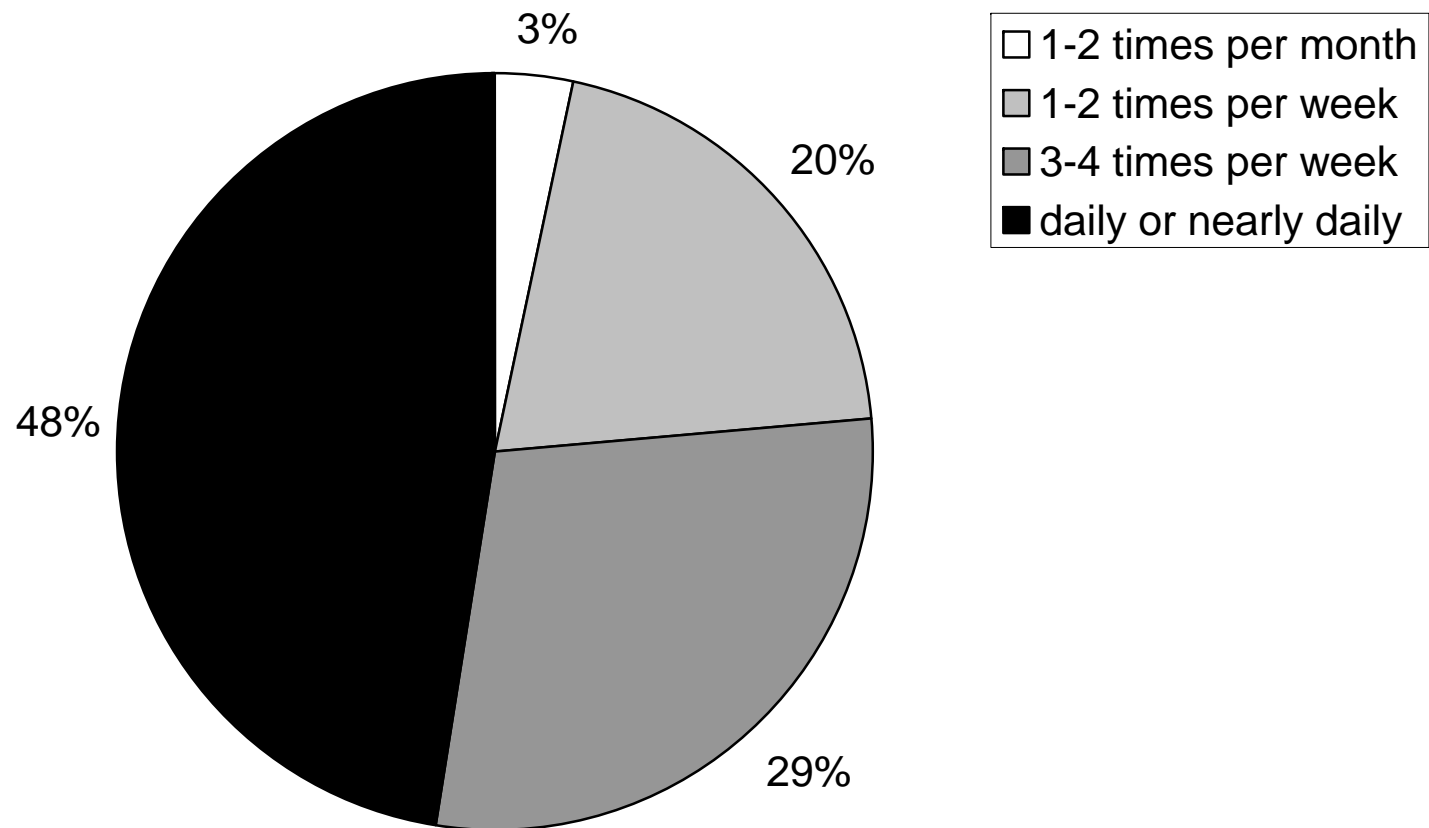
Participants of standardised interview

Age and place of residence

Age (years)	60-69	70-79	80-90	sum
City (Dresden, 500,000 inh.)	26	27	19	72
Hinterland / small and medium cities	26	26	13	65
Rural	27	28	15	70
Sum	79	81	47	207
Minimum	60	70	80	
Maximum	69	79	90	
Mean age	65.1	73.4	82.6	72.3
Median age	66	73	82	71
Standard deviation age	2.6	2.9	2.8	7.2

206 Participants of standardised interview

Frequency of cycling

- □ 1-2 times per month
- ▨ 1-2 times per week
- ▨ 3-4 times per week
- ■ daily or nearly daily

3%

20%

48%

29%

Standardised Interview

Topics

Health / physical difficulties when cycling and their compensation
- motility
- cardiovascular system
- nerve system
- muscle strength
- diabetes
- vision
- hearing

Mobility habits

Behaviour in traffic
- cycle where
- feeling of safety
- violations

Accident (including falls) after 59th birthday? If yes: details

1 to 2 hours

Accidents after 59th birthday

No accident: 109 persons

At least one cycling accident: 97 persons

Not assessed: number of accidents

Latest accident

        33 collisions

        64 single bike accidents

Accidents after 59th birthday

33 collisions

45% car

42% bike

6% pedestrian

1% motor assisted bike

1% dog

64 single bike accidents (several causes could be named)

41% surface: cobblestones, potholes, edges

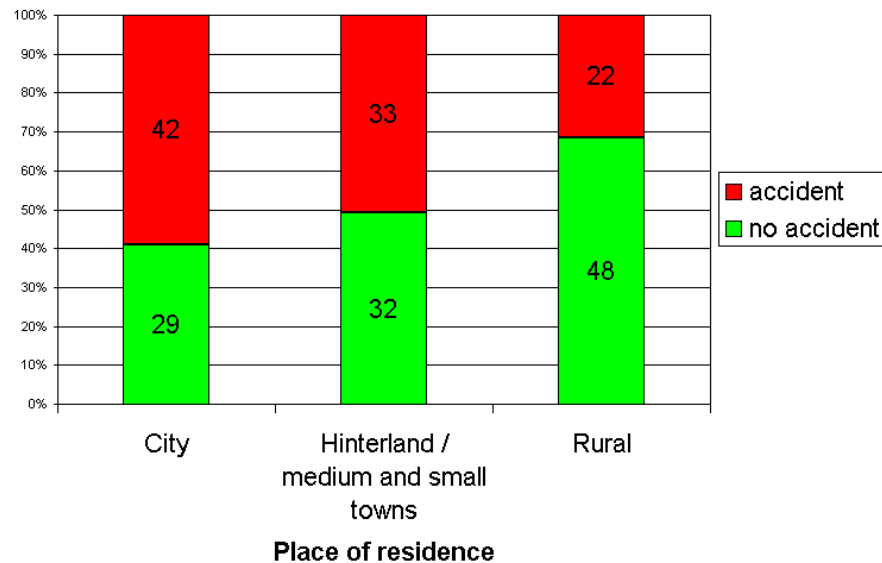29% weather/maintenance: wet ground, fallen leaves, snow

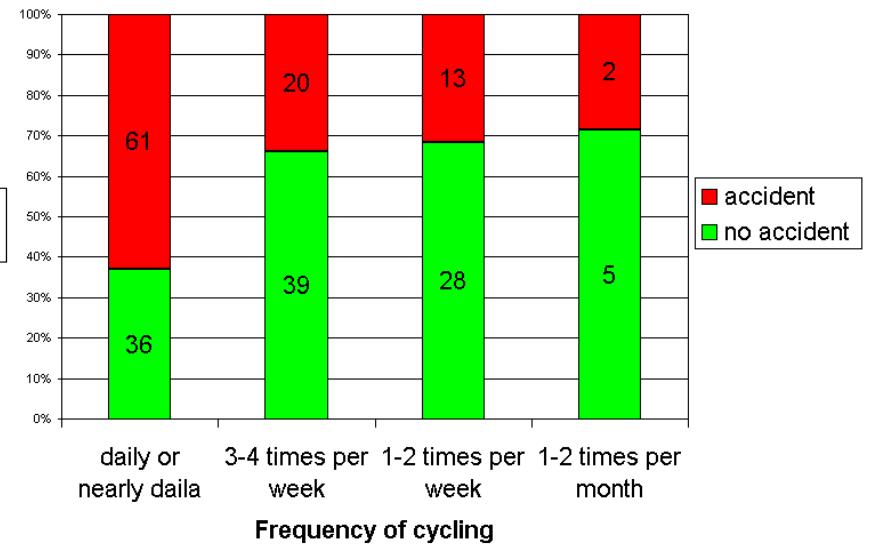21% bike related: got stuck on frame

8% luggage on handlebar

6% clothes got stuck on bike

3% fall when getting off the bike

Cyclists with and without accident: Exposure

More accidents in City than in rural area (p = .004, Scheffé test)

Cycling (nearly) daily: more accidents than cycling 3-4 (p=.005) or 1-2 times per week (p=.008, Scheffé test)

But: Persons cycle more often in the more densely populated areas

r(accident, density) = .23

partial correlation after controlling for cycling frequency: r = .17

Cyclists with and without accident

Gender

NO gender differences: $r = -.09$ (1=male, 2= female)
Same proportion of women and men were "safe" cyclists.

Number of accidents not assessed

Age

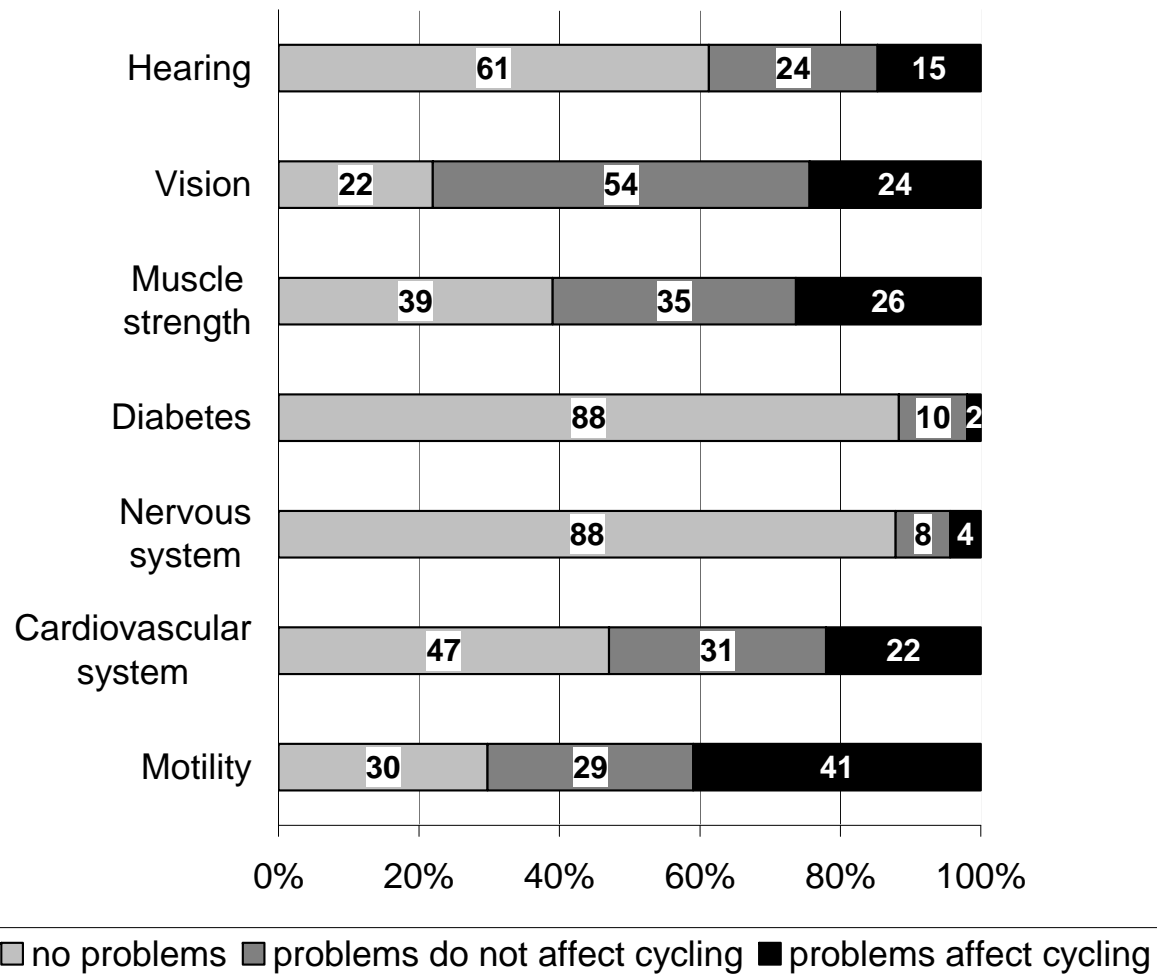NO age effect: $r = .06$ between age and accident (no/yes) ($N = 206$, $p = .435$).
NOT corrected for age
Same proportion of "safe" cyclists in all age groups.

$\Rightarrow$ Amount of and reasons for self-selection?

Accidents are one reason for older cyclists to give up cycling - rather at an old-old age than in the 60s

Reported physical problems

Category	no problems	problems do not affect cycling	problems affect cycling
Hearing	61	24	15
Vision	22	54	24
Muscle strength	39	35	26
Diabetes	88	10	2
Nervous system	88	8	4
Cardiovascular system	47	31	22
Motility	30	29	41

☐ no problems ◼ problems do not affect cycling ■ problems affect cycling

Effect of physical problems when cycling

86 persons with problems with **motility**. Of these:
- 48% problems **turning their head** when turning to a side with the bike
- 26% difficulties **getting on or off the bike**
- 20% felt unsafe in traffic

47 persons with problems with the **cardiovascular system**. Of these:
- 81% ascending slopes were harder to get up
- 55% less fit than in the past
- 17% felt unsafe in traffic
- Compensation: gear shift, cycling more slowly, taking more breaks, cycling shorter distances, avoiding ascending slopes

54 persons: **muscle strength** had decreased. Of these:
- Compensation like cardiovascular problems + parking bike on even ground

Effect of physical problems when cycling

72 persons: problems with their **vision** (without glasses). Of these:
- 31% poorer eyesight in the dark
- 11% felt less safe in traffic
- Compensation: wear glasses, have checked visual acuity regularly

35 persons reported difficulties with **hearing** (without hearing aid). Of these:
- 25% were startled often
- 31% felt less safe in traffic

20 persons with hearing aid. Of these:
- 70% had it on when cycling, 30% had it off

Cyclists with and without accident

How much problem affects the person when cycling:

Correlation with accident (no/yes) (1=does not affect cycling, 5=affects cycling much):

Motility	$(r = .07)$
Cardiovascular system	$(r = .05)$
Neurological	$(r = .00)$
Muscle strength	$(r = .01)$
Diabetes	$(r = .03)$
Vision	$(r = .14, p = .022, \text{1-tailed}, N=205)$
Hearing	$(r = .00)$

Correlation of accident and **maximum impairment** by any of these 7 problems:

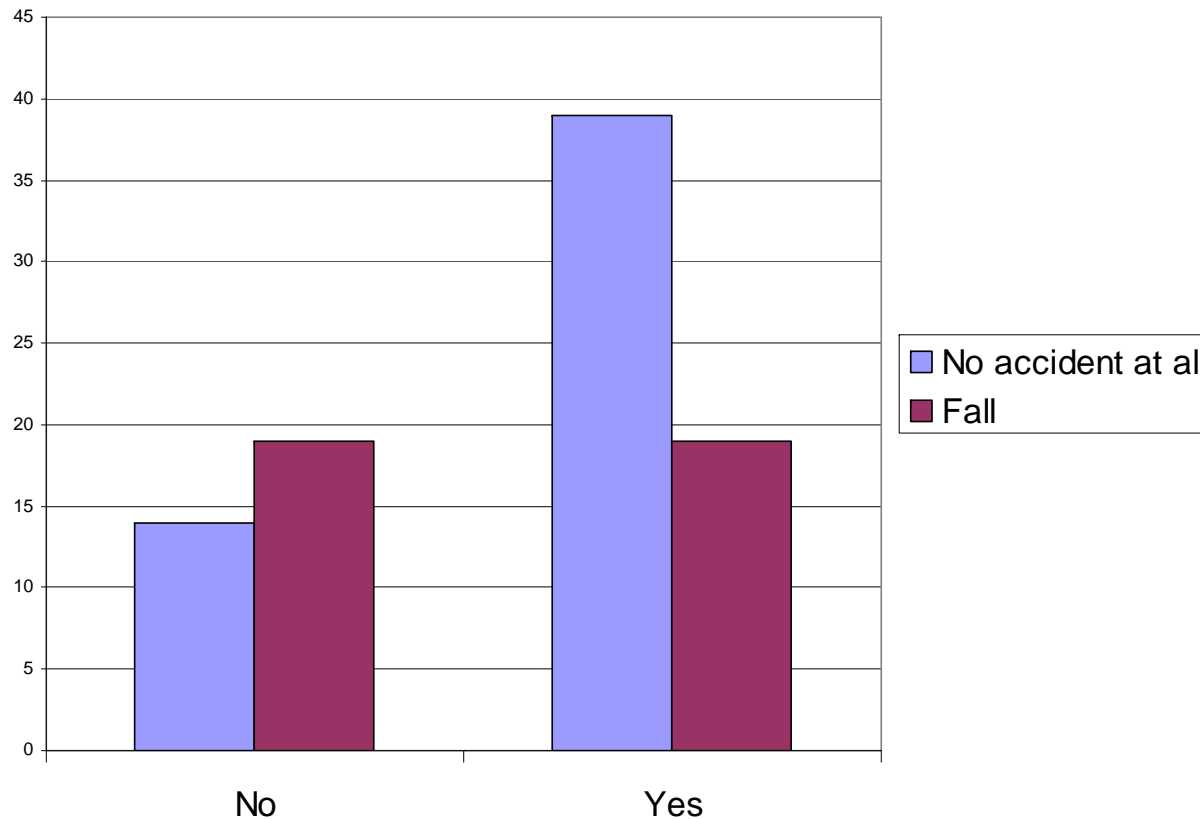$$rho = .15, p = .037, N = 206$$

Problems getting on/off bike
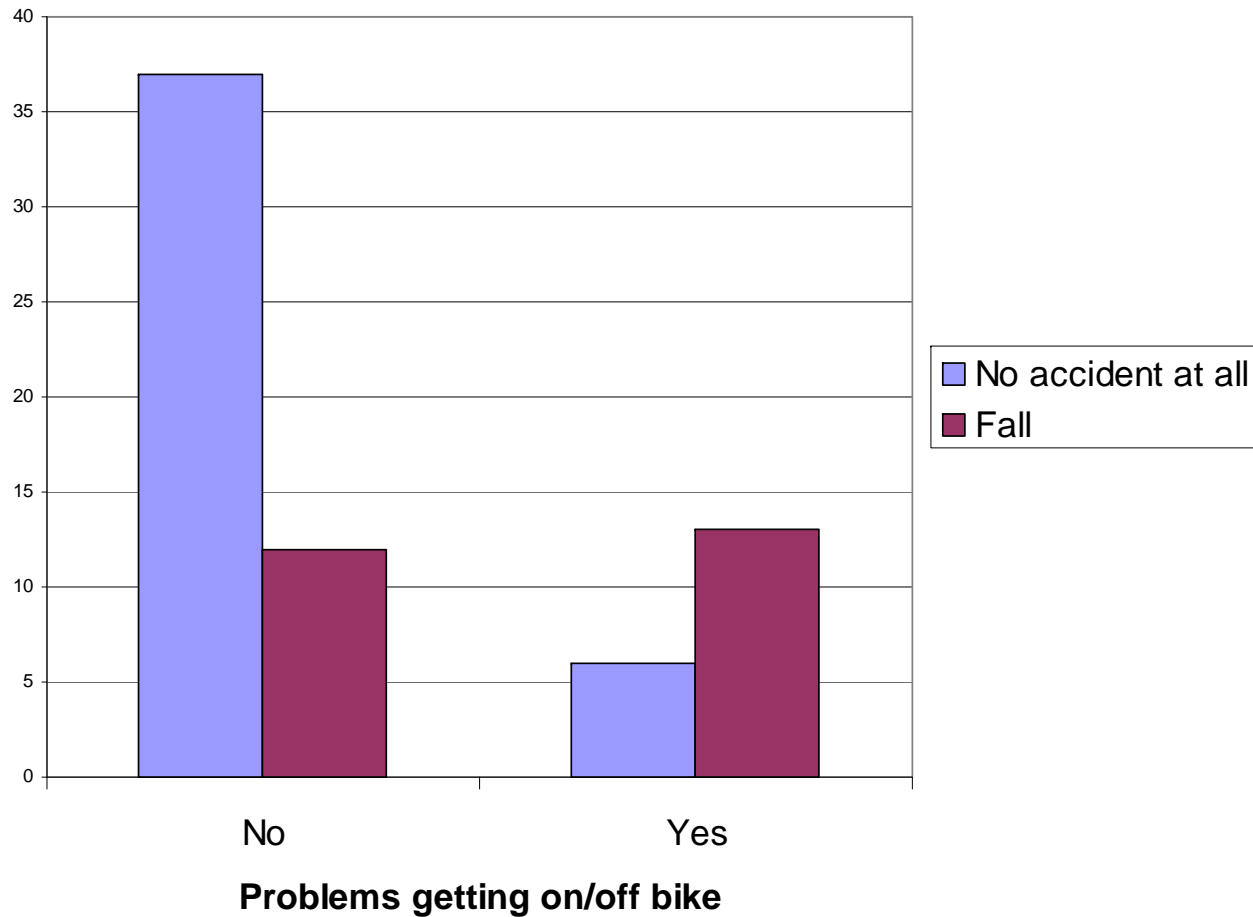
Fall after 59th birthday (no accident/fall):
Chi square = 11.366, (*p* = .002), 68 persons with motility problems affecting cycling
Any accident after 59th birthday (no/yes):
Chi square = 6.455, (*p* = .014), 85 persons with motility problems affecting cycling

**Feeling less fit => cycle shorter distances**

Fall after 59th birthday (no accident / fall):

Chi square = 5.326 (*p* = .028), 91 persons who felt differences when cycling between days when more or less fit

Any accident after 59th birthday (no/yes):

Chi square = 4.375 (*p* = .048), 110 persons who felt differences when cycling between days when more or less fit

Hearing aids and collisions

Hearing aid switched on when cycling
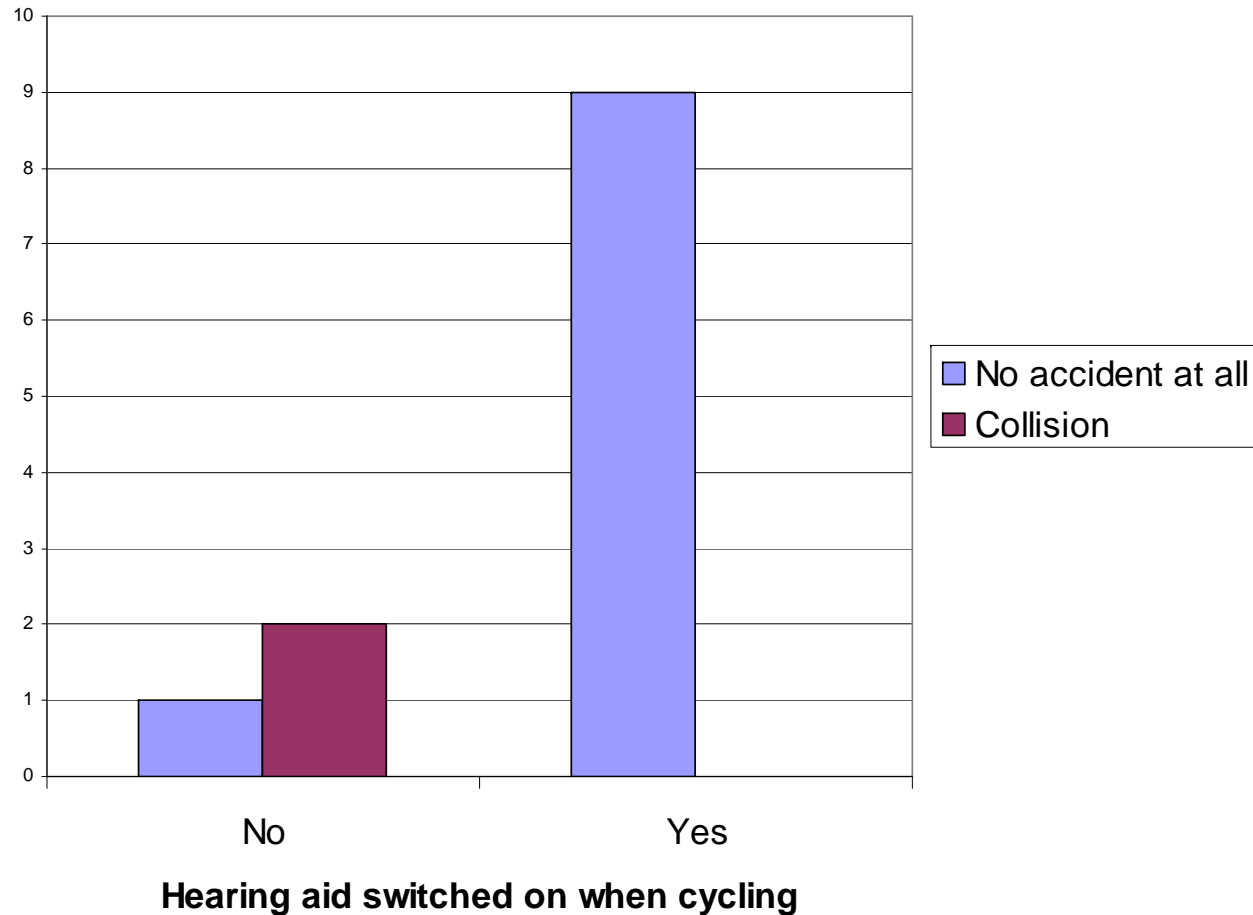
Collision after 59th birthday (no accident / collision):
Chi square = 7.200 (*p* = .045), 12 persons with a hearing aid – persons with fall excluded
Any accident after 59th birthday (no/yes):
Chi square = 4.677 (*p* = .063), 21 persons with a hearing aid

Cyclists with and without accident

Violations:

Persons with more violations have more accidents

"I cycle according to the rules" (no/yes) $\quad r = -.31$ ($p <= .001$)

run red lights (no/yes) $\quad r = .31$ ($p <= .001$)

cycle on the footpath (no/yes) $\quad r = .24$ ($p <= .001$)

cycle on roads which are forbidden for all traffic $r = .21$ ($p = .003$)

cycle in the wrong direction on the cycle path $\quad r = .18$ ($p = .012$)

run stop signs (no/yes) $\quad r = .14$ ($p = .046$)

Not:

one-way roads in wrong direction: $\quad r = .05$

pedestrian areas (only relevant for $N = 108$): $\quad r = .14$

Most relevant violations according to accident statistics: cycling on footpath and on cycle path on wrong side

Best predictor of accidents in our study: running red lights

Discussion

Exposition:

Cycling daily or nearly daily and cycling in denser traffic leads to more accidents

Violations:

Related to accidents – by one mechanism or more?

Statistics:

Dangers arise from cycling on the footpath and cycling on cycle paths on the wrong side where drivers do not expect cyclists.

Running red lights is not very dangerous (but very much in the focus of the media and the public). Does it show how a cyclist perceives risks?

Open question:

How do attitudes and behaviour towards rules change with age?

Discussion

Physical problems:

Limitation of the study: Rather healthy sample

No high correlation between accidents and (reported) physical problems which are related to aging

Candidates for further research:

- Motility: getting on and off the bike: sports training
- Hearing aids: for all ages

- Self-restriction
- Difference between cyclists who cycle (nearly) daily or less often

Candidates to try

- Proper cycling bags
- Tricycles: no more "handicapped" image

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Thanks

to you

for your attention

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