Odds of self-reported minor cycle crashes with conventional and electric assisted cycles adjusted for cycling frequency in Dutch and Belgian 40+year adults: a prospective study

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Background: Cycling for transportation and recreation is gaining in popularity, especially in older age groups. The rise in electric assisted cycles (EAC) may also have a role to play in this. With an increase in the number of cyclists comes an increase in the prevalence of cycle crashes. However, there is a lack of knowledge on EAC crashes and crash studies including cycle use data.

Study aim: To compare the odds of reporting a cycle crash on a conventional (CC) against electrically assisted cycle (EAC), while controlling for age, gender, BMI, cycling frequency and region of residence using prospective data collection.

Methods: A 12-month prospective cross-sectional survey-based study, including men and women cyclists aged 40+ years, was conducted in Belgium (3 regions) and the Netherlands. The study participants were the same as the once that participated in the study of de Geus et al[$]. Socio-demographics, crash details and cycling frequency data were collected every 3 months. Cyclists were grouped into CC, EAC or both (CC + EAC) based on the type of cycle they used during the prospective study period. [$] https://doi.org/10.1016/j.aap.2022.106893
Statistics: All statistical analyses were performed in R version 3.6.1 (R Core Team, 2013). To examine the odds of being reporting in a cycle crash, with a CC or an EAC, a multivariate logistic regression model was fitted with main- and interaction-effects. For each model odds ratios (OR) and their 95% confidence interval were calculated. To facilitate interpretation of the interaction-effects, odds were converted to a probability score (probability = odds/ 1 + odds).

Results: 921 participants filled out a total of 2040 questionnaires (on average, each participant completed 2.21 questionnaires) and recorded 202 crashes. 57% only cycled on a CC, 19% only on an EAC and 24% on both. Perceived health was sign lower (p<0.001) in the EAC group. Only 10 participants had to go to the hospital from which 4 had to stay >24h.

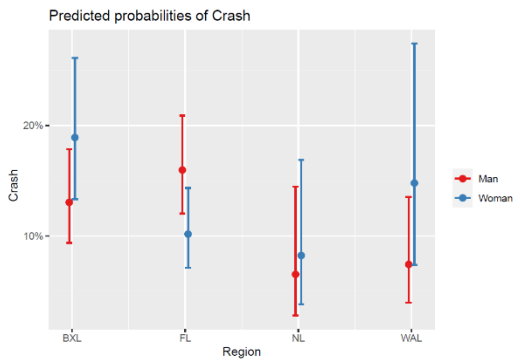
DESCRIPTIVE STATISTICS				
	No crash	**Crash**	**t / Chi²**	**p**
Age (years old)	61.8±10.8	55.5±9.5	8.74	<0.001
40-64 years (%)	55.3	79.7	43.31	<0.001
65+ years (%)	44.7	20.3		
Gender			0.104	0.747
Men (%)	57.5	58.9		
Women (%)	42.5	41.1		
Cycle type			7.695	0.021
CC	56.5	61.9		
EAC	19.9	11.9		
Both	23.5	26.2		
BMI	25.5	25.0	1.559	0.120
Health (score 0-5)	2.50±0.88	2.60±1.04	2.638	0.105
Region			30.57	0.001
BCR	21.1	35.1		
Flanders	50.1	49.5		
Netherlands	18.5	6.4		
Wallonia	10.2	8.9		

LOGISTIC REGRESSION: MAIN AND INTERACTION EFFECTS FOR THE ODDS OF REPORTING A CYCLE CRASH
glm(formula = Crash ~ CATage + Gender * Region + CATcycle * RExpTotalPros)

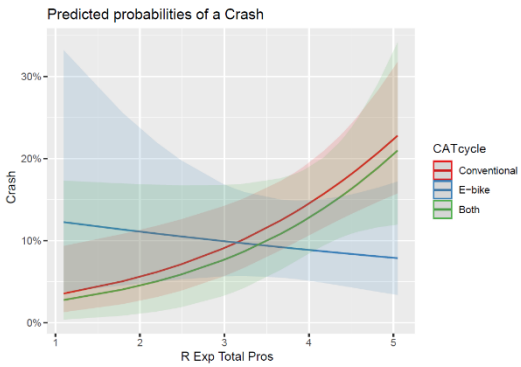
	OR [95% CI]	p
[Intercept]	0.02 [0.00-0.07]	**<0.001**
Cycle type (ref. = CC)		
EAC	7.77 [0.84-62.0]	**0.058**
Both	0.74 [0.03-11.5]	0.839
Gender (ref. = Men)		
Women	1.55 [0.92-2.62]	0.097
Age (ref. = 40-64 years old)		
65+ years old	0.44 [0.30-0.65]	**<0.001**
Health		
Cycling frequency [a]	1.69 [1.26-2.38]	**<0.001**
Region (ref. = BCR)		
FL	1.27 [0.81-2.00]	0.306
WAL	0.54 [0.24-1.07]	0.095
NL	0.47 [0.17-1.11]	0.109
Women (ref. = Men) * **Region-FL** (ref. = BXL)	0.38 [0.19-0.76]	**0.006**
Women (ref. = Men) * **Region-NL** (ref. = BXL)	0.83 [0.24-2.94]	**0.762**
Women (ref. = Men) * **Region-WAL** (ref. = BXL)	1.39 [0.45-4.25]	**0.563**
CATcycleEAC (ref. = CC) * **Cycling Frequency**	0.52 [0.30-0.93]	**0.023**
CATcycleBoth (ref. = CC) * **Cycling Frequency**	1.04 [0.54-2.17]	**0.913**

OR=Odds Ratios; CI=Confidence Interval; CC=Conventional Cycle; EAC=Electric Assisted Cycle; Both=CC+EAC; FL=Flanders; NL=the Netherlands; BCR=Brussels Capital Region; WAL=Wallonia
* interaction-effect; ref. = reference category; [a] log transformation of cycling frequency

The effect of gender on the likelihood of having a crash depends on the region. Woman in FL are less likely to have a crash.
Fig 1: glm(formula = Crash ~ CATage + gender * Région + CATcycle * Exposure)



The effect of exposure on the likelihood of having a crash depends on the cycle type. Higher odds with higher exposure for conventional and both.
Fig 2: glm(formula = Crash ~ CATage + gender * Région + CATcycle * Exposure)



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