

The Impact of Environmental Factors on Cycling Speed on Shared Paths

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Abstract

Cycling speed on shared paths is important to the amenity and safety of users. Speed was measured for 5421 riders using shared paths across Sydney. Multivariate analysis indicated that riders were less likely to cycle above the median speed on shared paths with a volume of over 20 pedestrians/hour and more likely to travel above the median speed on paths with a centreline, on wider paths and those with visual segregation between cyclists and pedestrians. The findings suggest that riders adjust their speeds according to shared path conditions and to accommodate pedestrians and highlight the importance of shared path design to the safety of users.

Background

In various countries, shared paths are frequently used to meet demand for cycling facilities that are separate from motorised traffic when space or resources are deemed inadequate for a bike-only path. While they often offer pleasant riding experience, there are increasing concerns about the safety offered by shared paths, particularly for pedestrians (Poulos et al., 2015; De Rome et al., 2015). Cycling speed is a key factor in the likelihood and severity of crashes on shared paths, particularly for collisions between cyclists and pedestrians where the wide difference in speed between these user groups may result in serious injuries to the pedestrians (Chong, Poulos, Olivier, Watson, & Grzebieta, 2010). Despite the importance of cycling speed on shared paths to the amenity and safety of users, few studies have systematically measured it, nor examined circumstances surrounding it.

Method

Speed was measured for 5421 riders who were observed cycling on shared paths across 12 metropolitan and regional locations in Sydney, Australia. At each location an “observation zone” of approximately 30m was selected – to allow good visibility for observers and for videoing. At one end of each observation zone a 4m “speed measurement stretch” [SMS] was marked out by drawing lines on the path. Video equipment (GoPro Hero 3 Black Edition camera) was set up centred on the SMS and at a minimum of 1.5m back from the path-edge to capture the view of bicycle tyres crossing the lines in the SMS for speed measurement. The time taken to cover the 4m speed measurement stretch (determined by video frames) was employed to calculate speed. Multivariate regression analysis was carried out to examine rider and environmental factors that contribute to riders cycling above the median speed.

Results

The study found that observed riders travelled at a median speed of 16 km/h (mean 18.4 km/h). Nearly 80% of riders travelled at 20 km/h or less and 7.8% at speeds of more than 30 km/h. Multivariate regression analysis indicated that riders were significantly less likely to cycle above the median speed on shared paths with an average volume of over 20 pedestrians/hour. Riders were significantly more likely to travel above the median speed on paths with a centreline (OR: 1.71, 95% CI: 1.41-2.07), on wider paths (over 3.5 m) compared to narrower paths (OR: 1.34, 95% CI: 1.12-1.59) and on paths with visual segregation between cyclists and pedestrians. Visual segregation was the strongest predictor of cycling travelling above median speed on shared paths (OR: 3.87, 95% CI: 3.09-4.84).

Table 1. Multivariate regression analysis of factors that contribute to cyclist riding above the median speed of 16 km/h on shared path

	Univariate			Multivariate		
	OR	95%	CI	Adjusted OR	95%	CI
Width of the path						
3.5 m or less*	1			1		
More than 3.5 m	2.19	1.96	2.45	1.34	1.12	1.59
Centreline						
Absent*	1			1.00		
Present	1.4	1.3	1.6	1.71	1.41	2.07
Visual segregation						
No*				1		
Yes	4.58	3.93	5.34	3.87	3.09	4.84
Commuter path						
No*	1			1		
Yes	2.48	2.22	2.78	1.1	0.98	1.24
Pedestrian volume on path (per hour)						
<20*	1			1		
20-99	0.48	0.42	0.55	0.66	0.54	0.80
100-199	0.09	0.07	0.11	0.15	0.11	0.20
>=200	0.46	0.39	0.53	0.61	0.45	0.81
Gender						
Male*	1			1		
Female	0.45	0.39	0.52	0.42	0.36	0.50
Age **						
20-29*	1			1		
14-19	0.35	0.20	0.61	0.53	0.29	0.96
30-44	0.92	0.81	1.04	0.77	0.67	0.88
45-64	0.68	0.58	0.80	0.55	0.46	0.66
65+	0.25	0.15	0.40	0.18	0.10	0.30
Interaction with pedestrian						
No*	1			1		
Yes	0.66	0.59	0.74	0.85	0.73	0.98
Weekend						
No*	1			1		
Yes	0.52	0.43	0.62	0.52	0.42	0.64
Time of the day						
AM*	1			1		
PM	0.57	0.51	0.64	0.49	0.44	0.56

*Reference category

** As estimated by observers

Conclusions

In the absence of separate cycling infrastructure that is exclusive to cyclists, shared paths are important, particularly for young and inexperienced riders who perceive them to be less risky than roads. The findings suggest that riders adjust their speeds according to shared path conditions and to accommodate pedestrians. They also highlight the importance of shared path design features that are adequate to traffic volume and speed and have the potential to improve the safety of users. These include appropriate width, the presence of a central line and visual or even physical separation.

References

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