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**Cyclists' experiences of harassment from motorists: findings from a survey of cyclists in Queensland, Australia**

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## **Abstract**

*Objective.* Harassment from motorists is a major constraint on cycling that has been under-researched. We examined incidence and correlates of harassment of cyclists.

*Methods.* Cyclists in Queensland, Australia were surveyed in 2009 about their experiences of harassment while cycling, from motor vehicle occupants. Respondents also indicated the forms of harassment they experienced. Logistic regression modeling was used to examine gender and other correlates of harassment.

*Results.* Of 1830 respondents, 76% of men and 72% of women reported harassment in the previous 12 months. The most reported forms of harassment were driving too close (66%), shouting abuse (63%), and making obscene gestures/sexual harassment (45%). Older age, overweight/obesity, less cycling experience (<2 years) and less frequent cycling (<3 days/week) were associated with less likelihood of harassment, while living in highly advantaged areas (SEIFA deciles 8 or 9), cycling for recreation, and cycling for competition were associated with increased likelihood of harassment. Gender was not associated with reports of harassment.

*Conclusions.* Efforts to decrease harassment should include a closer examination of the circumstances that give rise to harassment, as well as fostering road environments and driver attitudes and behaviors that recognize that cyclists are legitimate road users.

## **Introduction**

Cycling has been shown to improve cardiorespiratory fitness and decrease risk of all-cause and cardiovascular mortality (Oja et al., 2011). Although it is the fourth most popular recreational physical activity in Australia (Australian Sports Commission, 2009), approximately 1% of trips to work are made by bicycle (Australian Bureau of Statistics, 2008a), findings that are mirrored in the UK and the US (Pucher et al., 2010). Low rates of utility cycling may reflect in part high levels of harassment of cyclists (Garrard et al., 2006; O'Connor and Brown, 2010; Rissel et al., 2002), which in turn creates negative perceptions about the safety of cycling. Indeed, perceptions of safety, rather than actual safety, appear to be a key barrier to cycling (Emond et al., 2009; Jacobsen et al., 2009). This may be particularly true for women, who rate motorist aggression a more important constraint than do men (Garrard et al., 2006), and this greater concern may help to explain why fewer women than men cycle in low bicycle mode share communities (Jacobsen et al., 2009). Our aims were to conduct a more detailed examination of the incidence of self-reported harassment from motorists, and of gender and other possible correlates of such harassment, in a sample of cyclists in Queensland, Australia.

## **Methods**

### *Sampling and study protocol*

Queensland cyclists were administered an online survey to assess their cycling experiences. The sample was drawn from the adult membership (aged  $\geq 18$  years) of Bicycle Queensland (BQ), a state-wide community organization that promotes cycling for recreation and transport, organizes community bike rides and advocates for better cycling facilities and improved safety (Bicycle Queensland, 2011). A small proportion of members are competitive cyclists. BQ emailed invitations, with a link to the survey, to the 'primary members' of member households, to encourage all adult household members to participate. Approval was obtained from The University of Queensland Human Research Ethics Committee.

As reported elsewhere (Heesch et al., 2011), 2085 of 4469 invited households responded. Completed surveys were submitted by 1924 household members of BQ. Those who reported a residence outside Queensland ( $n=62$ ) or cycled off-road only and thus were not exposed to harassment from motorists ( $n=32$ ) were excluded, leaving data from 1830 respondents for analysis.

### *Outcome variables*

Respondents reported whether, while cycling, they perceived any intentional harassment from motorists or their passengers in the previous 12 months (yes, no). Respondents who perceived any harassment indicated whether they viewed it as *deliberately driving too close/tailgating (causing fear/anxiety), throwing objects, deliberately blocking your path, shouting abuse, and/or making obscene gestures/sexual harassment*.

### *Independent variables*

Respondents reported their sex, age, height, weight, educational level, and home postcode. Postcodes were used to determine socio-economic indexes for areas (SEIFA), a measure of the relative socio-economic advantage of geographic areas (Australian Bureau of Statistics, 2008b). Height and weight were used to calculate body mass index (BMI; kg/m<sup>2</sup>).

Respondents also reported how long they had been cycling as an adult (weeks/months/years), their cycling frequency (5–7 days/week to never in the last year), and the reasons for their cycling (*recreation [just for fun or exercise], competition, and/or transport [means of getting to and from places]*).

### *Statistical analysis*

Incidence of harassment was computed across categories of each quantitative variable. Multivariable logistic regression modeling was used to examine whether gender and other independent variables were correlates of harassment. Significance was set at  $p < 0.05$ .

## **Results**

Most respondents reported harassment. The most reported forms were driving too close, shouting abuse, and making obscene gestures/sexual harassment (Table 1).

Gender was not associated with harassment (Table 2) nor with any form of harassment (not shown). Older age, being overweight/obese, shorter cycling history (<2 years), and infrequent cycling (<3 days/week) were associated with less likelihood of harassment. Living in highly advantaged areas (SEIFA deciles 8 or 9) and recreational or competitive cycling were associated with increased likelihood of harassment ( $p < 0.05$ ).

## **Discussion**

The high level of perceived harassment found in this study is consistent with findings from a survey of cyclists in Victoria, Australia (Garrard et al., 2006), and an in-depth qualitative study conducted in England (McKenna and Whatling, 2007). Motorists'

harassment of cyclists is an under-researched topic, although it may be subsumed under ‘traffic’ and ‘safety’ concerns, which are major constraints on cycling in many English-speaking countries. The authors of a 2009 review concluded that “the real or perceived danger and unpleasantness of traffic discourages walking and bicycling” (Jacobsen et al., 2009). Formal research is lacking, but anecdotal reports suggest that driver harassment of cyclists is rarely experienced in high-cycling countries such as The Netherlands (Hembrow, 2011).

The high harassment rates in Australia and the UK may be due to the negative attitudes drivers have towards cyclists. In a study of Australian motorists (Rissel et al., 2002), 50% of respondents believed that cyclists should not be allowed to ride on the main roads. While this finding may reflect motorists’ reactions to negligent cycling behavior, it may also be indicative of motorists’ unprovoked hostility toward cyclists, possibly resulting from motorists perceiving cyclists as an ‘out-group’ of road users (Basford et al., 2002).

Male and female cyclists did not differ in their reporting of harassment. This finding suggests that, although female cyclists limit their cycling due to fear of harassment and safety concerns (Garrard et al., 2006), women who choose to cycle do not perceive more harassment while cycling than do men.

The significant correlates of reported harassment suggest that cycling type, location, style and ‘image’ may influence harassment. Experienced, normal-weight, young to middle-aged adults who cycle for recreation and competition (often on-road, using road bicycles, wearing ‘lycra’, and travelling at relatively high speed) might be a greater target for harassment by motorists than utilitarian cyclists, who often look, and cycle, somewhat differently. The apparent lack of harassment of cyclists in high-cycling countries such as The Netherlands, Denmark, Germany and Japan may be due in part to the predominance of utilitarian cycling in these countries. Indeed, a study conducted in two English cities found that driver behavior in the form of proximity while over-taking cyclists differed according to cyclist appearance (Walker, 2007).

Study limitations included sampling from a non-representative group of cyclists, although it included a cross-section of different types of riders. Although our response rate was excellent for an online survey (Manfreda et al., 2008) and is similar to response rates found for some large population-based studies in Australia (e.g., Mummery et al., 2008), it is low. Thus, our findings may not be generalizable to other cyclists. Other limitations include the cross-sectional design and the use of self-report harassment data from cyclists, which only allowed us to assess perceptions, rather than actual harassment. Regardless of intent, if

cyclists perceive motorists' actions as harassment, they can become fearful, losing a desire to cycle (Horton 2007).

## **Conclusions**

Most respondents reported harassment from motorists. Given that fear, including fear of harassment, is a barrier to cycling, a multi-level approach to reducing hostile motorist behavior is required. Campaigns that raise awareness of acceptable road behavior among motorists and cyclists; reinforcement of road rules, particularly the rights of cyclists on the road; and improved infrastructure that separates motorists from cyclists are warranted. A closer examination of the circumstances that give rise to harassment is required to inform these approaches.



**Conflict of interest statement**

None reported.

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Table 1

## Characteristics of a Queensland, Australia sample of cyclists, 2009 (n=1830)

Characteristics	n	% of Sample <sup>a</sup>	% of Men <sup>a</sup>	% of Women <sup>a,b</sup>
Gender				
Male	1,304	60.0		
Female	526	40.0		
Age (years)				p=0.0002
18-34	205	15.8	15.9	15.7
35-44	477	22.2	21.2	23.6
45-54	620	30.6	28.2	34.1
55-64	400	24.5	25.5	23.0
65+	128	7.0	9.2	3.6
BMI				p<0.0001
Normal (BMI <25)	1,006	58.9	50.1	72.0
Overweight/obese (BMI ≥ 25)	824	41.1	49.9	28.0
Education				p=0.03
No tertiary degree	260	14.3	13.8	15.1
Trade/apprenticeship certificate/diploma	352	18.2	20.0	15.5
Undergraduate degree	621	34.3	35.4	32.7
Postgraduate degree	597	33.1	30.8	36.7
SEIFA				p=0.07
Decile 10 (most advantaged)	509	28.0	27.7	28.4
Decile 9	546	29.0	31.3	25.6
Decile 8	328	18.2	18.3	18.0
Decile 7	155	8.9	7.9	10.5
Deciles 1-6 (most disadvantaged)	292	15.9	14.9	17.5
Years of cycling as an adult				p<0.0001
10+	783	39.7	45.8	30.2
5 - < 10	422	23.2	21.3	26.2
2 - < 5	436	25.1	22.8	28.8
0 - < 2	189	12.0	10.2	14.8
Cycling frequency				p<0.0001
5-7 days/week	446	23.4	27.7	16.9
3-4 days/week	715	38.8	40.5	36.2
1-2 days/week	505	27.8	26.2	30.1
At least once/month	93	5.8	3.3	9.4
At least once in the last year	71	4.4	2.3	7.4
Cycle for recreation				p=0.97
No	152	9.3	9.3	9.3
Yes	1,665	90.7	90.7	90.7
Cycle for transport				p=0.09
No	745	42.2	40.4	44.7
Yes	1,060	57.8	59.6	55.3
Cycle for competition				p=0.19
No	1,486	82.9	81.9	84.5
Yes	315	17.1	18.1	15.5
Experienced motorists' driving too close				p=0.27

No	620	34.4	33.3	36.1
Yes	1,210	65.6	66.7	63.9
Experienced motorists' shouting abuse				p=0.02
No	653	36.8	34.4	40.3
Yes	1,177	63.2	65.6	59.7
Experienced motorists' making obscene gestures or sexual harassment				p=0.02
No	987	55.0	52.5	58.7
Yes	843	45.0	47.5	41.3
Experienced motorists' deliberately blocking your path				p=0.02
No	1,395	76.8	74.7	80.0
Yes	435	23.2	25.3	20.0
Experienced motorists' throwing objects				p=0.03
No	1,517	83.4	81.6	86.0
Yes	313	16.6	18.4	14.0

BMI=body mass index, SEIFA= socio-economic index for area (a measure of the relative socio-economic advantage of geographic areas).

<sup>a</sup> Percentages are adjusted for clustering of respondents within households. Percentages may not add to 100% due to rounding error.

<sup>b</sup> p-values refer to differences between men and women in proportions within categories of a variable listed in the rows, using Pearson's chi-square test.

Table 2

Correlates of harassment while cycling, from motor vehicle drivers and their passengers in a sample of Queensland, Australia cyclists, 2009<sup>a</sup>

Variables	% who reported harassment	Adjusted <sup>b</sup> OR (95% CI)	
<b>Gender</b>			
Male	75.6	1.00	
Female	71.7	0.97	0.74-1.28
<b>Age in years</b>			
18-34	73.5	0.73	0.48-1.12
35-44	76.1	0.94	0.68-1.30
45-54 (ref)	76.2	1.00	
55-64	72.1	0.74	0.53-1.03
65+	65.8	<b>0.44</b>	<b>0.28-0.69</b>
<b>BMI</b>			
Normal (BMI <25)	76.7	1.00	
Overweight/obese (BMI ≥25)	70.2	0.73	<b>0.57-0.94</b>
<b>Education</b>			
No tertiary degree	74.6	1.04	0.71-1.51
Trade/apprenticeship certificate/diploma	74.4	1.06	0.74-1.53
Undergraduate degree (ref)	74.3	1.00	
Postgraduate degree	73.4	1.03	0.76-1.38
<b>SEIFA</b>			
Decile 10 (most advantaged)	69.9	1.00	
Decile 9	76.2	<b>1.44</b>	<b>1.05-1.97</b>
Decile 8	78.9	<b>1.64</b>	<b>1.12-2.40</b>
Decile 7	70.6	1.16	0.75-1.79
Deciles 1-6 (most disadvantaged)	73.7	1.16	0.79-1.70
<b>Years of cycling as an adult</b>			
10+	74.6	1.00	
5 - < 10	78.6	1.35	0.98-1.86
2 - < 5	72.4	0.90	0.65-1.25
0 - < 2	65.5	<b>0.67</b>	<b>0.45-1.00</b>
<b>Cycling frequency</b>			
5-7 days/week	84.3	1.00	
3-4 days/week	80.0	0.85	0.55-1.05
1-2 days/week	67.6	<b>0.42</b>	<b>0.29-0.58</b>
At least once/month	52.1	<b>0.22</b>	<b>0.13-0.32</b>
At least once in the last year	28.7	<b>0.08</b>	<b>0.04-0.15</b>
<b>Cycle for recreation</b>			
No	66.1	1.00	
Yes	74.9	<b>1.59</b>	<b>1.05-2.41</b>
<b>Cycle for transportation</b>			
No	71.7	1.00	
Yes	75.7	0.84	0.64-1.11
<b>Cycle for competition</b>			
No	70.8	1.00	

Yes	89.6	<b>2.56</b>	<b>1.67-3.91</b>
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BMI=body mass index, SEIFA= socio-economic index for area (a measure of the relative socio-economic advantage of geographic areas), OR=odds ratio, CI=Confidence Interval. The first category is the referent except where stated otherwise.

Bold data indicate statistical significant association at  $p < 0.05$ .

<sup>a</sup> Proportions and modeling adjusted for clustering by household.

<sup>b</sup> Adjusted for all other variables in the table.