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Bicycling under the influence of alcohol

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Abstract

Objective: According to international data estimates the proportion bicyclists with a positive Blood Alcohol Concentration (BAC) who are involved in accidents ranges from 15 to 57%. This large variance, and the fact that the reliance on accident statistics means that only the BAC of injured bicyclists is being collected, shows that we do not really know what the average and variation in BAC of bicyclists is, particularly on nights out.

Method: On a total of four nights between 5 PM and 8 AM BAC levels of bicyclists were collected with a Breathalyser (N=687). Samples were collected in two Dutch cities, one with a high (Groningen), and one with a modest, student population (The Hague).

Results: The results showed that the percentage of bicyclists who had alcohol in their blood rose over the night from 7.7% at 6 PM to over 89% after 1 AM. Furthermore, the percentage of bicyclists with an illegal BAC above 0.5 g/l rose from zero percent at 6 PM to 68% at 1 AM. The average BAC of bicyclists with a BAC above zero was 0.79 g/l. Differences between the two cities were limited.

Conclusion: Cycling with illegal levels of blood alcohol turns out to be very common on nights out in the Netherlands.

Highlights

- Breath samples of 687 bicyclists were taken between 5 PM and 8 AM across four nights
- Overall 62% had a BAC above zero, 41.6% had a BAC above the legal limit (0.5 g/l)
- The average BAC of bicyclists who tested positive on alcohol was 0.79 g/l
- On nights out after 1 AM 89% of the bicyclists had a BAC above zero, 68% had a BAC > 0.5 g/l
- BAC levels increased over the night

1. Introduction

International accident statistics suggest that alcohol plays an important role in the fatal accidents of bicyclists. Li and Baker (1994) found that on the basis of the Fatal Accident Reporting System (FARS), that 32% of bicyclists involved in a fatal accident had a Blood Alcohol Concentration (BAC) above zero, and that 23% had a BAC above 1 g/l (1 g/l equals 1 ‰), which was at that time the legal limit in many states of the USA. In line with this are the findings of Spaite et al. (1995) who reported that the consumption of alcohol and cycling is associated with greater injury severity. Specifically, that 15% of the recorded injured bicyclists had elevated alcohol levels, while 50% of the adult bicyclists who died had alcohol in their blood (Frank et al., 1995). More recently Orsi et al. (2014) found that in the German In-Depth Accident Study (GIDAS) database that 57% (N= 138) of the bicyclists involved in accidents had a BAC above 0.5g/l, which is the legal limit in Germany. Taylor et al. (2010) also report that the risk of injury increases with increased alcohol use; for motor vehicle accidents, the odds ratio increases by 1.24 per 10 g pure alcohol increase up to 52.0 at 120 g. A Finnish study also showed that the risk on being injured while cycling with a BAC of 1.0g/l is ten times as larger than the risk of injury for a sober bicyclist (Olkkonen and Honkanen, 1990). In addition to the effects of alcohol itself, another possible contributing factor to the severity of injuries is that the lack of helmet use is frequently reported in cases of alcohol intoxicated bicycle accidents (e.g. Li et al., 2001, Frank et al., 1995, Spaite et al., 1995, Crocker et al., 2010). Given that intoxicated bicyclists have been reported to have an increased risk of head and face injury, higher even than is typical for bicyclists, has also increased general comments supporting the use of helmets by bicyclists by some researchers (e.g., Andersson & Bunketorp, 2002), however, others state that the positive effect of helmets should not be overestimated (Robinson, 2010).

One of the reasons people cycle under the influence of alcohol could be that they do not wish to drive a motor vehicle after having consumed alcohol. From a social perspective this could be, in an odd way, praised. This is because, in principle, bicyclists themselves are most vulnerable while under the influence of alcohol, while in a motor vehicle in addition to being a large threat to themselves they also pose a larger potential threat to other road users. Alternatively, it could be that people are not aware of full legal regulations with regard to being on the road while intoxicated. In the Netherlands the law states that driving a car or motorcycle with a BAC above 0.5 g/l is illegal, while for novice drivers this limit is 0.2 g/l. For cycling the limit is 0.5 g/l for all, novice or otherwise. Despite this law, cycling under the influence of alcohol seems to be common in the Netherlands. For example, Verster et al. (2009) found in a survey that most students travel home by bicycle after having consumed alcohol, with an estimated average BAC of 0.95 g/l. However, their estimate was based on a questionnaire study, not on actual measured levels. Furthermore, students can be expected to have a higher education level on average, but whether there is a relation between education level and bicycling under influence is not clear. On the one hand, Bernstein et al. (2007) report that a lower level of education coincides with more alcohol consumption, but on the other hand students are found to make more frequent use of their bicycle. For example, in the Netherlands, in 2011, only 12.5 % of the students possessed a car opposed to 50.1 % of the total Dutch population (CBS, Statline, 2014).

Gender may also play a role. In general men consume more alcohol than women (Nolen-Hoeksema, 2004). Males have also been found to be more impulsive under the influence of alcohol (Labouvie and McGee, 1986, Nagoshi et al., 1991), which may be reflected in more easily accepting risks such as cycling under the influence of alcohol. Orsi et al. (2014) indeed found that female bicyclists involved in accidents were less likely to have consumed alcohol,

and Li and Baker (1994) found that positive test results for alcohol in males occurred twice as often when compared to female bicycle accident injured parties. They also found that it was in the age range of 25-34 that the largest number of accident involved bicyclists tested positive for alcohol.

Despite the results of the aforementioned studies, and the obvious issue of alcohol impaired bicycling, we are aware of only one group that has taken breath samples of bicyclists via a case controlled roadside survey. In doing so, Li et al. (2001) concluded that alcohol use while riding a bicycle seriously increases the risk on a serious or fatal accident. Li et al (2001) found BAC levels above 0.2g/l for one out of three of the fatally or seriously injured bicyclists, and for 3 % of the control bicyclists. While this is an interesting matched case-control study showing the effect of alcohol, it did not show how the prevalence of cycling under alcohol develops over a night out. Especially because Li et al. (2001) excluded bicyclists that were injured at night (between 9 PM and 5 AM). The study was also performed some time ago in the USA where cycling is generally not a dominant mode of transport. Whereas, cycling under the influence of alcohol may be even more common on nights out in countries like the Netherlands, where bicycle use is popular (Verster et al., 2009).

In the Netherlands a relatively large proportion of all accidents, 22 %, involve bicyclists as the injured parties (Netherlands Institute for Road Safety Research SWOV online database, 2013), and the reported proportion of bicyclists admitted to hospitals who have been drinking is increasing, in particular on weekend nights. In 1993 the proportion of bicyclists admitted to hospital that had been drinking, for 18-24-year olds, was 24%, and by 2008 it had risen to 58%. For 25-59 year olds it rose from 21% to 44% over the same time period. In weekends the presence of alcohol among injured bicyclists appears to be highest after midnight, when one in every two seriously injured bicyclists was found to be under the influence of alcohol during those hours (Twisk and Reurings, 2013). However, this was based on accident statistics, as such information about actual prevalence of cycling under the influence via an assessment of blood alcohol concentrations has, as far as we are aware, not been carried out in the Netherlands or in another country with a similarly high cycling prevalence. Therefore in the present study we tested the blood alcohol concentrations in the breath of randomly selected bicyclists in the streets in two city centres in the Netherlands. The study was performed in Groningen with a large student population and in The Hague. Groningen and The Hague differ in population (in 2014: Groningen had a population of 200,000, and The Hague 510,000), student population (Groningen 50,000, 25%, The Hague 28,000, 5%), and whether there are legal closing times of pubs (none in Groningen, in The Hague most pubs close at 2 AM). As an additional factor the day of the week was included, as in student cities such as Groningen, there tend to be typical evenings when many students go out. As such, the cycling population and their drinking habits on those evenings may be different from weekend nights. Another goal of the present study was to evaluate whether the percentage of bicyclists who cycle under influence of alcohol changes, and whether BAC levels change, over the course of the night.

2. Method

Ethical approval for the study was obtained from the Psychology Ethical Committee of the University of Groningen. The local police in Groningen and The Hague were informed about the study and the dates on which the study was scheduled, but the police were otherwise not actively involved in the study.

BAC data were collected on four days (two days for each city) in November 2013, on Thursday and Saturdays, from 5 PM to 8 AM (until 6 AM in The Hague, as in The Hague

most pubs close earlier and there is a lack of bicycle traffic in the vicinity of the bars after that). Data were collected in the city centres, in the nightlife district, where most people park their bicycle. Twelve students worked teams of three students, in shifts of five hours, and approached bicyclists who had just dismounted or were about to mount their bicycle. Bicyclists were not forced to stop, but cooperation was asked for from the first encountered bicyclist who was (un)locking their bicycle, thus the testing occurred directly before or after a bicycle ride. If the bicyclist did not want to cooperate, time, gender, and estimated age was written down. If bicyclists indicated that they were willing to cooperate a brief explanation of the study was initially given. Then, one student asked questions, and a second obtained the breath sample, while the third recorded the answers. Breath samples were collected with a Dräger Alcotest 7510 (Dräger Safety Inc., Lübeck, Germany) that displayed the BAC in two decimals. In Dutch legislation a conversion factor of 1:23 is used to convert breath alcohol results into blood alcohol results. For example, a breath alcohol concentration of 440 microgram per litre is converted into 0.5 grams per litre in blood. The BAC result was recorded, together with gender, whether people arrived or were about to depart, and their answers to the questions asked, including age, whether they had consumed alcohol the past four hours (and how much), whether they had used other drugs in that time, how long they just cycled or were about to cycle, whether they were student, and whether they knew if there are regulations with regard to bicycling under the influence of alcohol. The whole procedure took around 2-3 minutes per participant. At the end a flyer with a brief amount information about the study guaranteeing anonymity and providing contact information was given to participants. In case a BAC above .5 ‰ was detected participants were told that it is illegal to cycle, but they were not stopped from doing so. The information collected was not shared with the police, a procedure that was approved by the ethical committee.

3. Results

3.1 Participants

A total of 914 bicyclists were asked to participate. On average one out of four refused, but in The Hague more people refused to participate than in Groningen (Table 1). There was no significant effect of the day of measurement on refusal (χ^2=0.28, NS), but more women (31.3 %) than men (18.7%) refused to participate (χ^2=19.4, p<.001). There was also an effect of age on refusal. Specifically, the bicyclists who refused (M=29.7 years, SD= 11.3) were estimated to be, on average, older than those who cooperated (M=25.0 years, SD=8.7, F(1, 908)=26.7, p <.001), but a potential confounder is that the age of those who refused was estimated, while the age of the participants was directly asked.

Table 1. Participants and the number of people who refused to participate per city.

	Participated	Refused	Total
Groningen	448 (79%)	119 (21%)	567
The Hague	239 (69%)	108 (31%)	347
Total	687 (75%)	227 (25%)	914

Effect of city: χ^2=11.8 p=.001

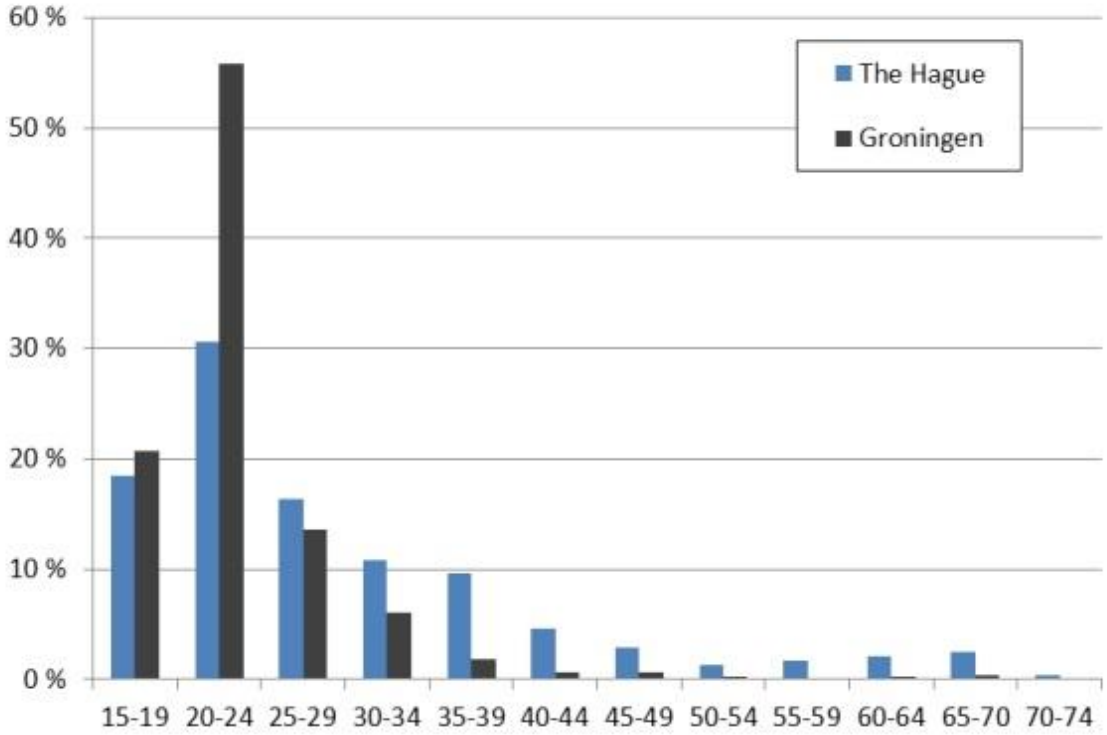


Figure 1. The age distribution of participants in the two cities (N=687). In the figure the total sample was set at 100% for each city.

In figure 1 the age distribution of participants is displayed. An overrepresentation of student-aged individuals is clearly visible in the 20-24 years age category in Groningen. This was confirmed by the questionnaire results. In Groningen 77.4% of the participating bicyclists reported that they were students, compared to 34.9% in The Hague (χ^2=120.0, p<.001). Of all participants 39.7% had just arrived and just dismounted their bicycle, while 60.3 % were about to leave on their bicycle. The average time that a participant reported that they had cycled or were about to cycle was 11.3 minutes (SD 9.6).

3.2 Blood Alcohol Concentrations

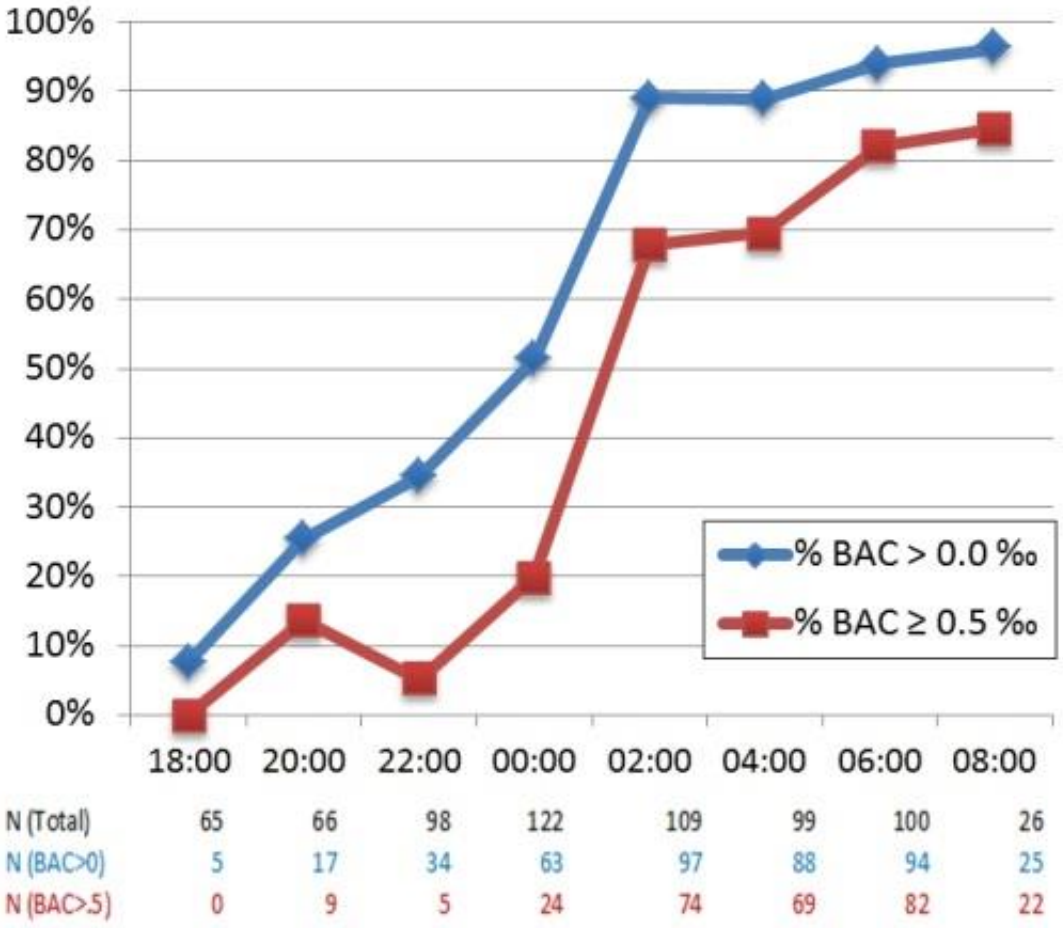
Table 2 shows the percentage of bicyclists who had a positive BAC and a BAC above 0.5 g/l, broken down by gender, city, and day of week. It is clear that more male than female bicyclists had a BAC above zero, in addition to more males also having an illegal BAC (BAC greater than 0.5 g/l). Also, when compared to The Hague, in Groningen more bicyclists were found to be under the influence of alcohol, and to be above the legal limit. No differences of day of the week were found.

Overall, across all cities and times, almost 62% of the participating bicyclists had alcohol in their blood and 41.6% had a BAC above the legal level. Of those who had a positive BAC the average level was 0.79 g/l (Table 2).

Table 2. The percentage of bicyclists with a BAC > 0, a BAC > 0.5g/l, and the average BAC of bicyclists who had a BAC above zero

	% BAC > 0 (N)	Statistics	% BAC > .5g/l (N)	Statistics	Average BAC of those with a BAC > 0 (SD)	Statistics F(1,421)
Male	68.2 % (259)	χ^2=14.8, p<.001	48.9 % (186)	χ^2=18.9, p<.001	.827 g/l (.454)	=3.60, p=.058
Female	53.8 % (164)		32.5 % (99)		.741 g/l (.455)	
Groningen	67.6 % (302)	χ^2=18.4, p<.001	47.7 % (213)	χ^2=19.4, p<.001	.805 g/l (.434)	< 1, NS
The Hague	50.8 % (121)		30.3 % (72)		.765 g/l (.507)	
Thursday	60.8 % (197)	χ^2=0.235, NS	41.7 % (135)	χ^2=0.001, NS	.765 g/l (.432)	= 1.40, NS
Saturday	62.6 % (226)		41.6 % (150)		.818 g/l (.476)	
Overall	**61.8 % (423)**		**41.6 % (285)**		**.793 g/l (.456)**	

In figure 2 the average and illegal Blood Alcohol Concentration, as measured from the bicyclists, is depicted over time. After midnight there is a steep increase in the percentage of bicyclists with alcohol in their blood, rising up to over 90% after 3 AM. The percentage of bicyclists with illegal BAC levels shows a similar pattern; after 1 AM 70% had a BAC above 0.5 g/l, and after 5 AM a peak of above 80% of bicyclists with a BAC above 0.5 g/l is reached. There were no differences in this pattern between the two cities even though in The Hague measurements stopped at 6 AM. There were also no differences between the two days of the week, Thursday and Saturday (Table 3). Only the effect of time period was significant for the BAC of bicyclists with a BAC above zero ($F(1,15)= 19.4$, $p < .001$)



	18:00	20:00	22:00	00:00	02:00	04:00	06:00	08:00
N (Total)	65	66	98	122	109	99	100	26
N (BAC>0)	5	17	34	63	97	88	94	25
N (BAC>.5)	0	9	5	24	74	69	82	22

Figure 2. The percentage of bicyclists that had a Blood Alcohol concentration above zero, and above the legal limit, per timeslot of 2 hours. Indicated time on the x-axis is the mid time (18:00 means from 17:00-18:59). The percentages can be expected to reflect the BAC of bicyclists in city centres on Thursday and Saturday nights, however, as co-operation was asked of people who just arrived or wanted to leave the city centre, commuting bicyclists are not included. It is expected that these bicyclists mainly would have affected the average BAC values between 07:00 and 09:00, and would have a lower BAC than the average shown here.

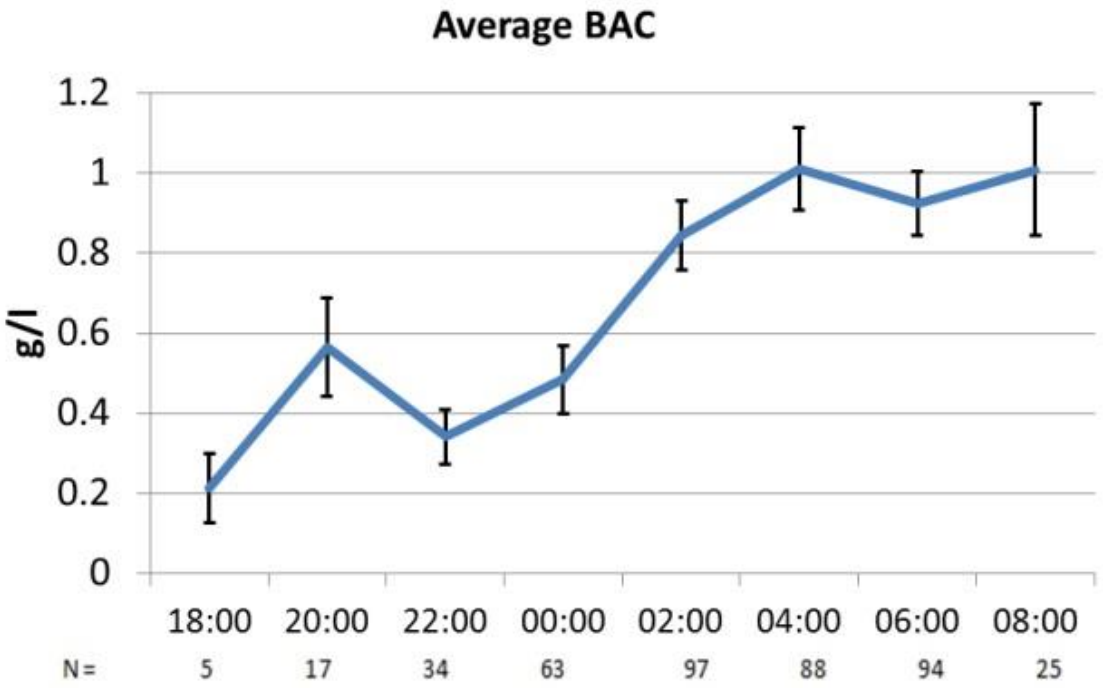


Figure 3. Average Blood Alcohol Concentration plus a 95% confidence interval of the bicyclists in the city centres who had a BAC above zero over the night. Time is displayed in two hour segments, 18:00 means registrations between 17:00 and 18:59. Data from all evenings and locations are combined.

From figure 3 it is clear that not only the percentage of bicyclists who had consumed alcohol rose over night, but also the average BAC of those who provided an alcohol positive breath sample increased as the night went on. After 3 AM the average BAC of the 90% of bicyclists who had consumed alcohol reached 1.0 g/l.

The average reported age decreased over the night (figure 4) from 31 to 22 years ($F(7, 679)=16.79$, $p<.001$) and there were no differences in average age or gender over the course of the night between bicyclists without and with a BAC above zero or above 0.5 g/l. The high average age of the sample with an illegal BAC between 21:00 and 23:00 is the result of a low number of participants in that category (see the N below the x-axis).

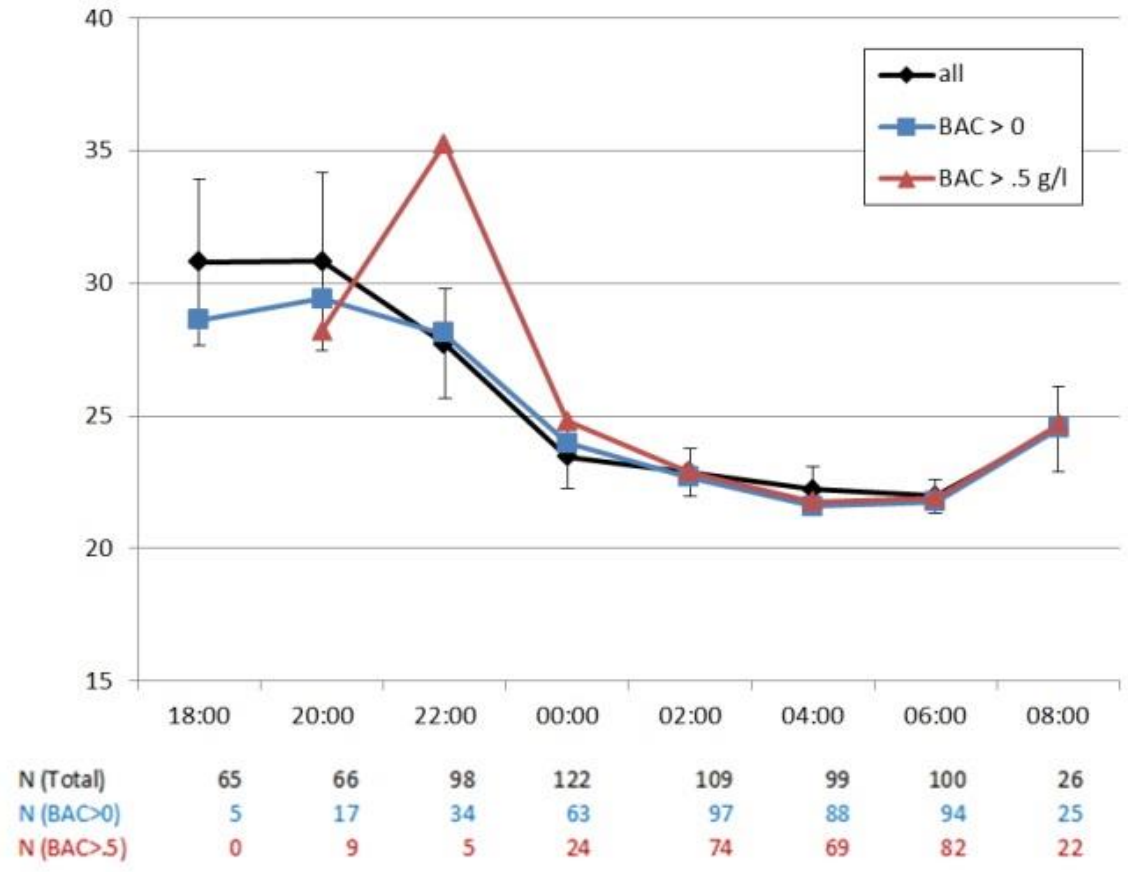


Figure 4. Average age of participants (all, those with a BAC above zero, and those with an illegal BAC) over the course of the night. A 95% confidence interval of "all" participants (Total) is indicated with error bars

Table 3. The percentage of participating bicyclists with a BAC above zero (% BAC > 0) and an illegal BAC (above 0.5 g/l) per city, day of the week, and time period.

	% BAC > 0		% BAC > 0.5 g/l		N(total)		Average BAC (SD) (N)		Statistics χ^2/Fisher	χ^2/Fisher
time	Groningen	The Hague	Groningen	The Hague	Groningen	The Hague	Groningen	The Hague	% BAC > 0	% BAC > 0.5
17-19	6.1	9.4	0.0	0.0	33	32	.24 (0.04) (2)	.20 (0.09) (3)	-	-
19-21	38.5	7.4	20.5	3.7	39	27	.55 (0.22) (15)	.68 (0.42) (2)	8.05, p=.005	3.83, NS
21-23	36.2	32.5	1.7	10.0	58	40	.31 (0.18) (21)	.40 (0.22) (13)	0.14. NS	3.35, NS
23-01	54.8	46.9	26.0	10.2	73	49	.51 (0.37) (40)	.42 (0.25) (23)	0.73, NS	4.64, p=.037
01-03	84.8	95.3	65.2	72.1	66	43	.87 (0.42) (56)	.81 (0.45) (41)	2.93, NS	0.58, NS
03-05	95.0	79.5	75.0	61.5	60	39	.97 (0.44) (57)	1.09 (0.55) (31)	5.76, p=.023	2.03, NS
05-07	93.5	100.0	81.5	87.5	92	8	.91 (0.37) (86)	1.12 (0.51) (8)	.56, NS	.18, NS
07-09	96.2		84.6		26	0	1.01 (0.40) (25)		-	-

	% BAC > 0		% BAC > 0.5 g/l		N(total)		Average BAC (SD) (N)		Statistics χ^2/Fisher	χ^2/Fisher
time	Thursday	Saturday	Thursday	Saturday	Thursday	Saturday	Thursday	Saturday	% BAC > 0	% BAC > 0.5
17-19	11.1	3.4	0.0	0.0	36	29	0.22 (0.08) (4)	0.21 - (1)	1.32, NS	-
19-21	25.0	26.9	12.5	15.4	40	26	0.58 (0.26) (10)	0.54 (0.23) (7)	0.03, NS	0.11, NS
21-23	37.8	32.8	8.1	3.3	37	61	0.37 (0.22) (14)	0.32 (0.18) (20)	0.26, NS	1.11, NS
23-01	45.9	57.4	21.3	18.0	61	61	0.49 (0.34) (28)	0.48 (0.33) (35)	1.61, NS	0.21, NS
01-03	90.7	87.3	68.5	67.3	54	55	0.83 (0.44) (49)	0.85 (0.42) (48)	0.33, NS	0.02, NS
03-05	91.4	87.5	71.4	68.8	35	64	0.98 (0.48) (32)	1.02 (0.49) (56)	0.35, NS	0.08, NS
05-07	98.0	90.0	84.0	80.0	50	50	0.84 (0.34) (49)	1.01 (0.42) (45)	2.84, NS	0.27, NS
07-09	100.0	93.3	90.9	80.0	11	15	1.05 (0.38) (11)	0.98 (0.42) (14)	0.76, NS	0.58, NS

Questionnaire

Participants were asked whether they had used drugs other than alcohol in the previous four hours. A total of 55 bicyclists (8%) stated that they had. More males (12.3% of all males) than females (3.0% of all female participants) reported the use of other drugs (χ^2=19.8, p<.001) and more drug use was reported in Groningen (10.5%) than in The Hague (3.8%, χ^2=9.38, p=.002). Cannabis was used by 12 bicyclists, Ecstasy by five, four reported the use of Amphetamine (speed, PEP), three reported cocaine, and one Lysergic Acid Diethylamide (LSD). Drug use in combination with alcohol was more common (7% of all participants) than drug use without alcohol (1%, seven participants). Participants were also asked how many drinks of alcoholic beverage they had consumed. After removing participants who claimed not to have consumed alcohol or who could not report the number of glasses, 465 participants were left. Their average BAC was 0.66 g/l (SD 0.51), and they reported to have drunk on average 7.7 units (SD=6.14) of alcohol. This number of reported units correlates somewhat positively with the measured BAC: r=0.57, p<.001.

Bicyclists were also asked whether they knew the law with respect to bicycling under the influence of alcohol, to get an impression of whether bicyclists were aware that there is a legal limit. In the Netherlands cycling with a BAC above 0.5 g/l is illegal, but no reference to a level was given in the question. The question was asked in a neutral way; "Do you know what is, and what is not allowed with regard to bicycling under the influence of alcohol?" Only 39% of the total sample were able to give the correct answer themselves, with those in The Hague showing more awareness (44.1%) than in Groningen (36.3%, χ^2=3.96, p=.047). Bicyclists who had a BAC above zero, and above 0.5 g/l did not significantly differ in their ability to demonstrate an awareness of the law from those who had a BAC of zero (χ^2=1.38, NS, and χ^2=0.67, NS respectively).

Logistic regression analysis

A logistic regression analysis with BAC above or below the legal limit as a discrete dependent variable was performed. The analyses were performed with the following covariates: Time (blocks of 2 hours), Gender, Age (years), Student (yes/no), Location (Groningen/The Hague), Day (Thu/Sat), Knew legal regulations (yes/no), and Used other drugs the past 4 hours (yes/no). Only Time (of night) turned out to be a good predictor (Model summary: Nagelkerke R^2 = .492, Wald (Time) = 140.7, p < .001). As some variables correlated, a re-analysis with only Time of night was performed resulting in an odds ratio of 2.514. So, on average with every 2 hours later in the night, the likelihood that the recorded BAC was above 0.5 g/l is increased by 2.5.

4. Discussion and conclusions

Across four nights, in two Dutch cities, BAC measurements were taken from bicyclists in and around popular nightlife areas. It was found that, on average, almost 62% of the bicyclists in total had alcohol in their blood, and over 40% had a BAC level that is illegal to cycle with in the Netherlands. The average BAC of those who had consumed alcohol was 0.79 g/l, which is close to the estimated BAC of 0.95 g/l reported by Verster et al. (2009). Furthermore, it was found that, unsurprisingly, as the night went on the blood alcohol concentration levels measured in bicyclists increased, with a steep increase in BAC between midnight and two AM. Later in the night the percentage of bicyclists with a BAC above zero rose. Specifically, in this study after 1 AM, 90% of the bicyclists had alcohol in their blood, and this percentage

rose even further early in the morning to up to 96 %. At 1 AM 68% had a BAC above 0.5 g/l and in the morning at 8 AM this percentage was 85%. These percentages can be expected to reflect the BAC of bicyclists in city centres on Thursday and Saturday nights, however, as co-operation was asked of people who had just arrived or wanted to leave the city centre, commuting bicyclists are not included in the sample. It is expected that commuting bicyclists would have mainly have had an effect on the BAC values between 07:00 and 09:00, and that their BAC is likely to be lower than the bicyclists who took part in the study. However, is expected that outside of this 07:00 – 09:00 period, that the time frames used by this study have collected a representative sample of city centre bicyclists. Given the high prevalence of alcohol use amongst cyclists found in this study it is perhaps not surprising that in accident data positive BAC levels are found for many bicyclists in the Netherlands (SWOV online database, 2013).

Some of the other effects that were expected were also found, for example, more male than female bicyclists were found to be riding their bike under the influence of alcohol. Nevertheless, over the whole measurement period 54% of females who took part in the study had alcohol in their blood while cycling, and one out of three of these females had a BAC above 0.5 g/l. However, no relation between measured BAC values and whether the participant was a student was found. Drug use was not tested, but based on what was reported, 4% of the bicyclists in The Hague and 10.5% in Groningen had used other drugs, almost all of these had used drugs in combination with alcohol. Combining drugs and alcohol has been found to have a larger effect on cognitive performance and driving performance than alcohol alone (e.g., Veldstra et al., 2012) resulting in higher accident risks (Hels et al., 2011 of Bernhoft et al., 2012). It may be that combining certain drugs with alcohol have a different effect than alcohol alone on bicycling.

A few confounding elements in this study should be mentioned. First of all the test team consisted of 12 students, eleven of whom were female. This may have had an effect on willingness to cooperate, and may account for the higher willingness of men to participate. Another confound is the 'knowledge of the law' that was assessed. As it was not always possible to completely isolate participants from their peers, there have been occasions where peers have influenced the answer given on this question. Still, overall only 39% were aware of the legal limit, which implies that 61 % were not. It would have been nice to compare this to knowledge of the limit with regard to driving a motor vehicle. It is also not clear whether there were many who consciously decided in advance to ride their bicycle instead of a car, or if they even owned a car. Another issue is that this is a limited voluntary sample across four nights taken in city centres. Future studies may consider working with police and setting up compulsory stops across a longer time period and perhaps at location(s) outside of the city centre. This would, however, also involve legal action by the police, which could, given the findings of this limited sample, result in many prosecutions.

Based on the findings of this study, which suggest that a large proportion of bicyclists are under the influence of alcohol, and therefore likely to be at a higher risk of harming themselves or others, a question needs to be asked; should the enforcement and prosecution of bicyclists with illegal BACs be pursued? It would not be desirable that these bicyclists would drive a car instead of cycling, where they would pose a larger hazard to others. However, the nature of the Netherlands, which makes it a cycle friendly country also often makes walking an option, which may be safer. Another option could be to promote, and provide, more night services for public transport, although that carries its own issues with the safety of drivers of such vehicles and the public nuisance issues that may come along with intoxicated patrons of public transport.

In conclusion, based on this sample, cycling with high (illegal) blood alcohol levels on nights out in the Netherlands appears common and widespread, particularly after midnight. This is a serious public health issue for the Netherlands where accidents involving bicyclists under the influence of alcohol appears to be both significant and increasing (SWOV online database, 2013), but poses difficult practical issues in terms of what can be done to address the problem.

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