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Failure to reduce drinking and driving in France: a 6-year prospective study in the GAZEL Cohort

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ABSTRACT

Aim: An unprecedented decline in alcohol consumption and road mortality **has** recently **been** observed in France, but it is still unclear whether **or not** these changes affected Driving While alcohol-Intoxicated (DWI). The objective of the study was to prospectively estimate trends of excessive speed on the roads, alcohol consumption and DWI between 2001 and 2007 in a large cohort of experienced drivers.

Methods: Participants were current employees or recent retirees of the French national electricity and gas company, who volunteered to participate in a research cohort established in 1989 under strict conditions of anonymity. An annual cohort questionnaire is sent each year to participants that includes two questions about overall alcohol consumption. In 2001 and 2007, 10 684 participants reported their driving behaviours using the same self-administered questionnaire.

Results: Between 2001 and 2007, the proportion of participants (N=10 684) who reported having driven at speeds at least 20 km/h above the limit decreased from 23.7% to 4.1% in built-up areas ($p<0.001$), from 34.3% to 9.3% on rural roads ($p<0.001$) and from 24.3% to 2.7% on highways ($p<0.001$). Regular and non-regular excessive alcohol consumption decreased from 22.7 to 19.7% and from 18.0% to 14.9% respectively, whereas DWI increased from 22.9% to 25.3% over the same period ($p<0.001$).

Conclusions: A recent crackdown on road violations by **the** French government **has** failed to deter DWI. Given that DWI seems to be a sporadic and rarely **punished** behaviour, its prevention requires more coercive measures, such as **using a** breath alcohol ignition interlock device.

Introduction:

In France, a country with a long-standing history of tolerance toward alcohol consumption and road traffic offences [1, 2], two major public health successes were recently observed. First, rates of alcohol consumption per capita and alcohol-related diseases **have** continuously decreased over recent decades, concomitantly with an increased awareness of the **potential** negative **effects** of alcoholic beverages [3-5]. Second, traffic law enforcements were significantly enhanced in 2002, with an increased crackdown on road violations, which **helped significantly** to reduce mortality on the roads [6]. Recent figures show that road fatalities decreased by 40.1% between 2001 and 2007 [7], concomitantly with an average 8.5% reduction in observed speed on all road surfaces.

The conjunction of declines in both alcohol consumption and risky road behaviours over a limited period is an unprecedented event, but it is still unclear whether **or not** these changes **have** affected Driving While alcohol-Intoxicated (DWI), since offenders can be detected exclusively through targeted police alcohol checks and in the aftermath of injury/fatal crashes. Awareness **of** the risk of being drunk when driving **has** reached excellent levels in Europe since, according to a large-scale study conducted in 2003, 87% of drivers considered DWI as a major cause of road crashes, **and** 92% in France [4]. Yet, various individual and environmental factors might jeopardize the impact of prevention messages **regarding** DWI on actual road behaviour, especially in societies where alcohol is considered an integral part of cultural traditions [4].

Therefore, we conducted a prospective longitudinal study in a large cohort of experienced drivers (the GAZEL cohort) to estimate trends in road risky behaviours, alcohol consumption and DWI between 2001 and 2007.

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Methods

The participants were current employees or recent retirees of the French national electricity and gas company, Electricité De France–Gaz De France, who volunteered to participate in a research cohort, known as the GAZEL cohort, under strict conditions of **confidentiality**. The GAZEL cohort was established in 1989 and originally included 20 624 subjects, men aged 40–50 and women aged 35–50 at baseline. Since 1989, this cohort has been followed up yearly [8]. The study protocol was approved by the French authority for data confidentiality (Commission Nationale Informatique et Liberté).

Data collection

A Driving Behaviour and Road Safety (DBRS) questionnaire was administered two times, in 2001 and 2007. Only drivers who participated in the 2001 survey received the 2007 questionnaires. **Participants were asked to estimate their frequency of driving while alcohol-affected over the past 12 months by responding to the following question: “How many times in the last year did you take the wheel after having drunk too much alcohol?”** (Never, few times a year, once a month or more). **They also reported their past 12-month maximum speed on three types of roads: built-up areas, where the speed limit (SL) is 50 km per hour (31.1 mph), rural roads (SL= 90 km/h; 55.9 mph), and highways (SL=130 km/h; 80.8 mph). These road types are the most commonly used in French National Statistics to describe road behaviours.** Sociodemographic data from the cohort database included gender, year of birth (1939–1943, 1944–1948, 1949–1953), occupational category (unskilled worker, skilled worker, manager).

As part of the routine follow-up of the cohort, each year participants **are sent a cohort questionnaire** that includes questions about **two aspects of their alcohol consumption: the number of drinking days per week** (“during the last week, **on** how many days did you drink

alcohol?") and **the maximum number of drinks per drinking day** ("during the last week, **what is the maximum number of drinks (beer, wine, and liquor) you had in a single day**"?).

Statistical analyses

Men (women, respectively) were considered "excessive" drinkers if they had consumed at least 4 (3) drinks/days. Among excessive drinkers, those who reported drinking alcohol 6-7 days/week were classified as "regulars", while others were classified as "non-regulars".

Risky driving behaviours were categorized as follows: reporting a maximum speed of at least 20 km/h (12.4 mph) above the speed limit in built-up areas, on rural roads and on highways (yes/no) **over the last 12-month period**, and driving after having drunk too much alcohol at least a few times in a year (yes/no) **over the same period**. Changes in risky road behaviours and excessive alcohol consumption between 2001 and 2007 were assessed **using the non-parametric McNemar test**.

Results

Of the 14 200 participants who **returned** the 2001 DBRS questionnaire, 11 494 (80.9%) sent back the 2007 questionnaire. Those who reported having stopped driving either in 2001 or in 2007 (n=546) and those who did not answer questions about DWI (n=264) were excluded. The final study sample comprised 10 684 respondents. Comparisons at baseline (2001) between participants in the study sample (N=10 684) and excluded or non-responding respondents (N=3516) showed that reporting of DWI was similar and that overall alcohol consumption was higher among participants (11.2 vs. 10.5 drinks per week, respectively).

Most respondents were males (77.7%), skilled workers (57.7%), born between 1944 and 1948 (52.7%) and consuming 11.2 drinks/weeks on average in 2001. Between 2001 and 2007, the proportion of participants who reported having driven at speeds at least 20 km/h above the limit decreased from 23.7% to 4.1% in built-up areas ($p<0.001$), from 34.3% to 9.3% on rural roads ($p<0.001$) and from 24.3% to 2.7% on highways ($p<0.001$) (Figure 1A). The proportion of participants reporting regular and non-regular excessive alcohol consumption decreased from 18.0% to 14.9% and from 22.7 to 19.7%, respectively ($p<0.001$), whereas DWI increased from 22.9% to 25.3% over the same period ($p<0.001$) (Figure 1B). Among participants who reported episodes of DWI in 2001 and 2007, 1.8% reported such episodes to occur “once per month or more”, while others reported fewer occurrences (“sometimes in the year”).

Gender differences were investigated, revealing that changes were similar with regard to gender, although women reported less risky behaviours than men in 2001.

Discussion

These results show that **the** increased crackdown on road violations by **the** French government in 2002 failed to deter DWI between 2001 and 2007 in a cohort of experienced drivers, **although** both excessive alcohol consumption and speed decreased over the same period [6, 9]. DWI increased by almost 10%, **and was** reported by more than one out of five **participants** on average. This is consistent with national statistics indicating that the proportion of drivers **who tested positive for** Blood Alcohol Content (BAC) increased between 2001 and 2007, despite the expected deterrent effect of more frequent BAC checks on the road and harsher penalties [10].

Several factors might explain **why** preventive measures **were ineffective** against DWI **but** effective against excessive speed. First, automated controls have been used to increase the likelihood of detecting speeding offences and preventing speeding in specific locations. One thousand five hundred automated radar units were deployed between 2001 and 2004, and captured more than 1 million images a month, which likely enhanced the perceived probability of being punished and, in turn, **acted as a** deterrent **to** speeding [9, 11, 12]. The picture is quite different when it comes to DWI, since offenders can be detected exclusively through police alcohol checks, making the probability of being caught very low [13, 14].

Second, the higher prevalence of DWI in southern **European** countries, where alcohol consumption is part of **the** cultural background and lifestyle [14], as compared **with** their northern counterparts, suggests that drinking habits might jeopardize efforts to prevent DWI in these societies. Excessive alcohol intake **has** declined since 2001 in France [15], as well as in our study sample, with no apparent effect on DWI. According to participants' self-reports,

DWI occurs a few times a year, while consuming significant amounts of alcohol is more frequent, occurring up to 6-7 days/week in nearly 20% of the sample. It is thus likely that respondents manage to dissociate their usual alcohol intake from their driving, except **on** rare occasions. Drinking wine during dinner with friends and/or family and at social events is a relatively common practice in France, **which** might explain why abstinence is more difficult to adopt before driving than in other circumstances [16-18]. Accordingly, 69.3% of alcohol-related road fatalities in France occur at night-time (44.3% in nights during **the** weekend and holidays) [10].

Socially stigmatized behaviours such as speeding, DWI and alcohol intake are prone to be underreported in studies using self-questionnaires, because of social desirability bias [19]. There are strong elements, however, supporting the reliability of self-reported behaviours in our survey, since Road Traffic Collision trends paralleled trends in self-reported behaviours in the GAZEL cohort, such as speeding [6, 20], DWI [6, 20], sleepy driving [6, 21], and phoning while driving [6, 20]. Our study population included employed and retired middle-aged drivers from a large company **who were** relatively exempt from alcohol-related diseases [22], which may limit the generalizability of our results. However, it is likely that our results are conservative since participants were experienced drivers, with a moderate alcohol intake, and are under-represented in road fatal crashes [7, 10, 23]. As DWI remains a **worrying** issue in most industrialized countries, the large size of our cohort and the inclusion of diverse trades and socioeconomic groups **offer** a unique opportunity to assess longitudinal trends in road behaviours. **This may subsequently help** to evaluate traffic regulation initiatives against alcohol-related traffic mortality.

In conclusion, **the** crackdown on road violations by **the** French government in 2002 failed to deter occasional DWI between 2001 and 2007, while excessive speed declined over the same period. Given that DWI seems to be a sporadic and rarely **punished** behaviour, its prevention requires more coercive measures, such as **using a** breath alcohol ignition interlock device.

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Figure Legends:

Fig1A: Percentages of participants **who** reported maximum speeds at least 20 km/h above the limit **over the last 12-month period** in 2001 and 2007

Fig1B: Percentages of participants **who** reported excessive alcohol intake **in the last week** and driving while intoxicated **over the last 12-month period** in 2001 and 2007

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Fig1A: Percentages of participants who reported maximum speeds at least 20 km/h above the limit over the last 12-month period, in 2001 and 2007

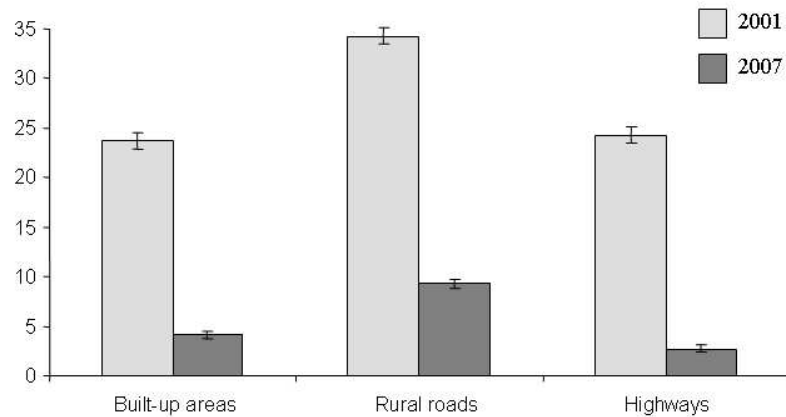
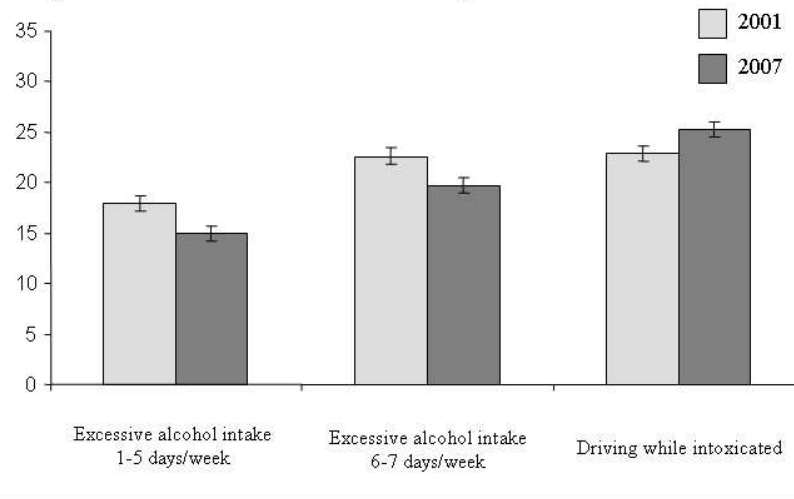


Fig1B: Percentages of participants who reported excessive alcohol intake in the last week and driving while intoxicated over the last 12-month period in 2001 and 2007



Note: error bars represent upper and lower bounds of 95% confidence intervals

Fig1A: Percentages of participants who reported maximum speeds at least 20 km/h above the limit over the last 12-month period in 2001 and 2007

Fig1B: Percentages of participants who reported excessive alcohol intake in the last week and driving while intoxicated over the last 12-month period in 2001 and 2007

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