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Title:

Impact of retirement on risky driving behaviors and attitudes toward road safety among a large cohort of French drivers (the GAZEL cohort)

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Abstract

Objective: To investigate changes in driving behaviors and attitudes toward road safety, following retirement, in a large cohort of road users.

Methods: In 2001, 14 226 participants of the GAZEL cohort, France, reported their attitudes toward road safety and driving behaviors using a self-administered driving behavior and road safety questionnaire. In 2004, 82% of them ($n = 11\ 706$) responded to the same questionnaire. Two complementary logistic regression analyses were performed assessing the association of: 1) retirement with change to safe driving behaviors and attitudes toward road safety between 2001 and 2004, and 2) time since retirement with risky driving behaviors and negative attitudes toward road safety in 2001.

Results: Among the participants who were active in 2001 ($n=3\ 927$), those retiring between 2001 and 2004 (66%) were more likely to have discontinued sleepy driving (adjusted odds ratio (aOR) = 2.12, $P = <0.001$) and phoning while driving (aOR = 1.74, $P = 0.006$) than those who remained professionally active. The second analysis showed that the likelihood of sleepy driving and phoning while driving decreased shortly after retirement whereas that of speed driving decreased over a longer interval. Retirement had no influence on driving while intoxicated and attitudes toward road safety.

Conclusions: Our results suggest that any professional activity may account for some risky road behaviors. As work-related road traffic accidents are responsible for one road casualty out of four in France, therefore, monitoring and prevention of sleepy driving and phoning while driving among workers should be further considered.

Key terms: Cell phone use; professional activity; road traffic safety; sleepy driving; speed

driving.

Abbreviations: CI, confidence interval; DBRS, driving behavior and road safety; DWI, driving while intoxicated; EDF-GDF, Electricité De France–Gaz De France; km/yr, kilometer per year; OR, odds ratio; RTA, road traffic accident.

INTRODUCTION

Driving behaviors have been recognized as the principal cause of road traffic accidents (RTAs) (1), but their relationship to the working environment among non-professional drivers has been little studied (2-4). There is evidence that professional factors may have a role in the risk of being involved in a crash, since RTAs are a leading cause of deaths at work in industrialized countries (5-7). In France, work-related RTAs are responsible for one road traffic casualty out of four (6, 8) and forty percent of fatal work accidents are RTAs, a proportion that rises to sixty percent when accidents during commuting to work are included (9).

Many studies show that professional drivers, such as taxi or truck drivers, are at higher risk of accident involvement than the general population, mainly because of high driving mileage (2, 10, 11). Although driving exposure is undoubtedly related to work-related fatalities on the road, other work-related factors might increase the risk of RTAs, in both professional as well as non-professional drivers (12). Work pressure, responsibilities, and work constraints are likely to affect one's ability to drive, during and outside working hours (3). For instance, we have shown that work-related fatigue, shift work, and prolonged standing postures at work are significant risk factors for RTAs in a large cohort of employees (13).

Accordingly, moving out from the strains of work may have a significant impact on driving behavior. Data from a one-year prospective randomized trial of 224 men showed a decrease in the magnitude of Type A personality, characterized by impatience, hostility and aggressiveness, after one year of normal retirement, suggesting that people are more patient, easy-going and relaxed after they move out from work constraints (14). As aggressiveness and Type A

personality are significantly related to more RTAs, greater frequency of breaking traffic laws, greater impatience when driving, engaging in more risky driving behaviors, and negative attitudes toward road traffic safety (15), such changes following normal retirement may improve road behaviors and attitudes toward traffic safety. Unfortunately, studies on road behaviors in older drivers are cross-sectional, making it difficult to distinguish between changes in driving that reflect natural adjustment to a changed life situation and those reflecting age- or health-related issues, such as impaired ability to drive or dementia (16, 17).

Similarly, recent findings suggest that age plays a major role in attitudes toward road traffic safety, as older drivers have higher levels of normative motivation to comply with traffic laws than younger drivers (18), but the influence of work discontinuation alone on attitudes toward road traffic safety has not been studied before. Previous research, however, has shown the importance of knowledge, beliefs, and attitudes in determining behavior, and changing attitudes toward road traffic safety is considered as an effective and long-lasting approach to improve road behavior (19).

As normal retirement represents a moving out from demanding or stressful career jobs, work pressures, responsibilities and work constraints (20), prospectively assessing behavioral and attitudinal changes following this major life change represents an opportunity to evaluate the influence of professional activity on RTAs. The objective of this longitudinal study was to investigate changes in driving behaviors and attitudes toward road safety following normal retirement in a large cohort of road users of diverse professional trades.

METHODS

Participants

The participants were current employees or recent retirees of the French national electricity and gas companies, Electricité De France–Gaz De France (EDF-GDF), who volunteered to participate in a research cohort, known as the GAZEL cohort (GAZEL stands for GAZ and ELectricité) (21). This cohort was established in 1989 and originally included 20 624 subjects working at EDF-GDF, men aged 40–50 years (n=15 010) and women aged 35–50 years (n=5 614) at baseline. Since 1989, this cohort has been followed up by means of yearly self-administered questionnaires and data collection from the company's human resources and medical departments. The objectives and methods of the cohort have been described in detail elsewhere (21).

A Driving Behavior and Road Safety (DBRS) questionnaire was administered twice, in February 2001 and February 2004. The drivers who participated in the first survey received the second one in 2004. This questionnaire was previously pilot-tested on 500 randomly selected participants. The answers and comments of the 330 respondents were used to finalize it.

Measurements

The exact date of retirement was available for all participants who retired before September 2005. Behavioral data included maximum speed reported on three types of roads (built-up areas, rural roads, and highways), driving while intoxicated (DWI), sleepy driving, and cell phone use while driving. Risky behaviors, which were significantly associated with the risk of being crash involved, were defined in a previous study (22) using the same cohort database: risky speed driving was defined as reporting a maximum speed over 65 km/h in built-up areas, 100 km/h on

rural roads, and 145 km/h on highways, DWI was defined as reported driving after having taken too much alcohol to drive a “few times a year or more” during the past 12 months, risky sleepy driving was defined as reported driving while feeling sleepy a “few times a year or more” during the past 12 months, and risky phoning while driving was defined as initiating a cellular telephone call while driving, whatever the circumstances.

Attitudes toward traffic safety were assessed by asking participants whether they agreed or disagreed with a set of 12 statements, referring to two topics with 6 statements each, related to traffic safety and currently debated in France, namely, relaxing existing regulations and increased traffic enforcement. These statements have been described in detail elsewhere (23). Level of agreement was assessed by summing up the number of affirmations with each topic in a summary score (range 0-6). Agreement with relaxing existing regulations was categorized in two approximately equivalent categories: low (0-1) and high (2-6). Similarly, agreement with increased traffic enforcement was categorized in two groups: low (0-3) and high (4-6). A “negative attitude” toward road traffic safety was defined as a high agreement with relaxing existing regulations and as a low agreement with increased traffic enforcement.

Sociodemographic data from the cohort database included gender, year of birth, marital status, occupational category, and alcohol consumption habits. Light drinkers of alcohol were defined as men (women) reporting 1-14 (1-7) drinks over one week, as opposed to heavy drinkers reporting more than 14 (men) or more than 7 (women) drinks over the same period. Regular drinkers were defined as those who reported consuming alcohol on three or more days in the week, as opposed to episodic drinkers who reported drinking alcohol on fewer than three days a week. Other potential factors included in the study were annual driving mileage during the last 12 months, and

type of vehicle owned in 2001.

Analyses

Risk behaviors and negative attitudes towards road safety were assessed in 2001 and 2004 and percentages of change were computed for each variable (statistical significance assessed by McNemar test). Safe behavioral change was defined as discontinuation of a given risk behavior in 2004 among those who reported it in 2001 and conversely, risky behavioral change was defined as discontinuation of a given safe behavior in 2004 among those who reported it in 2001. Safe attitudinal change was defined as reporting a positive attitude toward road traffic safety in 2004 among those who reported a negative attitude in 2001 and conversely, risk attitudinal change was defined as reporting a negative attitude toward road traffic safety in 2004 among those who reported a positive attitude in 2001. A first analysis prospectively assessed the relationship between retirement and safe changes between 2001 and 2004 among participants who were still professionally active in 2001. The likelihood of the given safe behavioral or attitudinal change was assessed in participants who retired between 2001 and 2004 as compared with those who remained professionally active in 2004, using an unconditional logistic regression model and SAS software, version 9.1.3 (24). These analyses were further adjusted for gender, age, marital status, alcohol consumption, occupational categories, road mobility and type of vehicle owned in 2001.

A second analysis was conducted to assess how rapidly changes occurred following retirement by measuring the likelihood of risky behaviors and attitudes towards road safety in 2001 as a function of time since retirement. Exact retirement date and response date to 2001 questionnaire were used to obtain time since retirement in 2001. The likelihoods of risky behavior and negative

attitude toward road traffic safety among professionally active participants in 2001 were compared with those of participants who had been retired for less than two years and those who had been retired for two to three years. Logistic regression analyses were performed adjusting for the other variables as described above.

RESULTS

In 2001, the questionnaires were sent to 19 894 living members of the cohort. The response rate was 71.5% (N=14 226). The response rate of the second driving behavior questionnaire, sent in 2004 to 13 447 participants, was 87.1% (N=11 706). Participants reporting that they did not drive any 2- or 4-wheel motorized vehicle (N=399) were excluded from the analysis. Questionnaires with improperly filled response dates (day or month missing) were also excluded.

Changes in driving behaviors/attitudes toward road safety among retired and professionally active participants between 2001 and 2004

Participants who responded to the two questionnaires and were professionally active at the response date in 2001 (N=3 927) were selected for this analysis. Sixty six percent of them retired between the 2001 and 2004 questionnaires (mean (SD) age at retirement: 55.7 (2.2) years). They were managers (40.6%), skilled workers (50.1%), and unskilled workers (9.3%), and most of them were men (65.8%). Alcohol consumption was considered as “high” for 29.0% of respondents and “low” for 56.9%, while 14.1% reported no alcohol consumption (Table 1). One-fourth reported driving a small vehicle with annual mileage from 10 000 to 20 000 km/year.

(Table 1)

Between 2001 and 2004, the proportion of participants who changed to safe behaviors was significantly higher than those who changed to risky behaviors ($P < 0.05$). For instance, 79.7% of participants (N = 1 063) who reported risky speed in built-up areas in 2001 changed to safe speed in 2004 (Table 2), while only 3.4% of participants (N = 2 785) who reported safe speed in 2001

changed to risky speed on the same road in 2004 (Table 3). The same trend was observed for all considered risky behaviors except for DWI, where less participants changed to safe behavior (N = 280) than to risky behaviors (N = 370). Similarly, the proportion of participants who changed to positive attitudes toward relaxing existing regulations was significantly higher than those who changed toward negative attitudes (45.5% vs. 12.3%). Similar proportions of participants changed to positive and negative attitudes toward increased traffic enforcement between 2001 and 2004.

Between 2001 and 2004, risky speeding decreased by 70.7% for built-up areas, by 53.1% for rural roads, and by 76.5% for highways ($P < 0.001$). Similarly, sleepy driving decreased by 12.1% and phoning while driving decreased by 46.2% , whereas DWI increased by 10.7% over the same period ($P < 0.001$). Similarly, the proportion of participants who agreed with relaxing existing regulations decreased by 28.1% ($P < 0.001$) and those who changed to increased traffic enforcement increased by 4.4% ($P = 0.01$).

(Table 2)

(Table 3)

Participants who retired between 2001 and 2004 were more likely to discontinue risky sleepy driving and phoning while driving than participants who remained professionally active (table 4). No significant association was found between other behavioral and attitudinal changes between 2001 and 2004 and retirement during the same period.

(Table 4)

Risky behaviors/attitudes toward road safety among retired and professionally active participants in 2001

Out of 8 005 participants who were selected for this analysis, 41.3% were professionally active in 2001 whereas 23.5% had been retired for less than two years and 35.2% had been retired for two to three years (mean (SD) age at retirement: 54.3 (2.6) years). Most of them were men (80.7%) and skilled workers (52.3%).

Participants who had been retired for two to three years were more likely to report safer speed in built-up areas, on rural roads, and on highways as compared with the professionally active participants (Fig 1. A-C). Similarly, the likelihood of sleepy driving and phoning while driving was lower in participants who had been retired for less than two years and those retired for two to three years, as compared with professionally active participants (Fig 1. E-F). The likelihood of DWI and negative attitudes toward road safety were similar among groups (Fig. 1. D, G-H).

(Figure 1, Parts A-H)

DISCUSSION

Findings from this study of a large cohort of participants belonging to diverse trades show that the likelihood of risky road behaviors, except DWI, decreased between 2001 and 2004 in all participants and that retirement tended to facilitate changes toward safer road behaviors. We showed that likelihood of discontinuing sleepy driving and phoning while driving was significantly higher among participants who retired between 2001 and 2004 as compared with those who remained active professionally. The analyses of the likelihood of risky road behaviors as a function of time since retirement before 2001 highlighted that the likelihood of sleepy driving and phoning while driving decreased shortly after retirement, whereas risky speed driving decreased more slowly over time. Retiring from work had no significant effect on DWI and attitudes toward road traffic safety.

Most studies focusing on the relationship between work and road behavior included professional drivers (2, 3, 25), who are not representative of the general population as far as driving is concerned (2, 10, 11, 25). The present study prospectively assessed behavioral changes following normal retirement among a large cohort of participants of diverse trades, thus highlighting how any professional activity can affect road behavior.

The decrease in sleepy driving, observed in the study population between 2001 and 2004, is likely to be facilitated by retirement during this period. The decreased likelihood of sleepy driving among those who retired is consistent with previous studies showing that job stress was associated with poor quality of sleep (26), and that retirement provided additional time for night sleep and consequently decreased daytime napping (27). Likewise, the decrease in phoning while

driving observed in the study population between 2001 and 2004 was facilitated by retirement, most likely because of the interruption of cell phone use for work purposes, which represents a large part of cell phone use while driving (28). Sleepiness and cell phone use in drivers are increasingly recognized as important factors contributing to the burden of traffic-related morbidity and mortality (29, 30), and our findings clearly show that professional activity partially accounts for their prevalence.

The likelihood of sleepy driving and risky phoning while driving diminished shortly after retirement, while those of speed driving remained high and decreased more slowly over time. These findings may indicate that speed driving on the whole was less related to work constraints than sleepy driving and phoning while driving, as confirmed by previous data showing that speeding does not usually decrease in periods when work constraints are diminished (during week ends, leisure time, and summer holidays) (8). This delayed decrease in speeding among retired participants may indicate a progressive change in lifestyle (31, 32), rather than a direct consequence of work discontinuation. As the time lapse between the two questionnaires was three years, this inertia (or tendency to resist change) of risky speed driving may explain the absence of immediate significant changes in risky speed driving after retirement between 2001 and 2004. Moreover, because the likelihood of risky speed driving decreased significantly during the same period in all participants, it is also possible that speed driving decreased similarly among retired and professionally active participants, resulting in a decrease in magnitude of change, thus lowering the statistical power of comparison between groups. Indeed, speed control efficiency dramatically improved during the 2002-2004 period in France, with the widespread use of binocular laser and automatic speed radars, which were partly responsible for a 145% increase in speeding tickets (8). Major changes in road behaviors were concomitantly observed in France,

with significant reductions in observed speed driving, mean driving speed, and road casualties (8).

DWI and attitudes toward road traffic safety were not influenced by retirement, suggesting that these variables were independent of work-related factors. DWI is a complex and multi-factorial problem which is not only related to compliance with traffic regulations, but also to alcohol abuse and dependence, cultural background, psychological issues, and attitudes toward DWI (33-35). For instance, a study found that among 224 trauma patients with a positive blood alcohol content (BAC) at admission, 40% had a current alcohol dependence diagnosis, and 12% were both alcohol- and drug-dependent (33). As the likelihood of this high-risk road behavior increased between 2001 and 2004 in the study population, further investigation of its determinants is a crucial issue for public health.

Findings from a previous study using the data from the same cohort participants showed that support for relaxing existing regulations decreased significantly while support for increased enforcement waned slightly between 2001 and 2004 (23). According to the Theory of Planned Behavior (36), attitudes toward road safety are significant predictors of road behavior (22), but results from both analyses showed that retirement had no influence on their changes over time. A study found that older drivers had higher levels of normative motivation to comply with traffic laws than younger drivers (18), indicating that age played a major role in shaping attitudes toward road traffic safety. On the whole, as the study population is aging, it is likely that participants changed their attitudes toward road traffic safety in a similar way, independently of retirement status.

Self-reports might underestimate behaviors, especially when forbidden or socially unacceptable behaviors are concerned (37). There are elements, however, pointing to a fair reliability of self-reports on behaviors and attitudes in our survey. First, significant trends between the risk of RTAs and self-reported well-known behaviors were found in the GAZEL cohort (speeding, DWI, sleepy driving, and phoning while driving) (22, 38). Second, we observed a fair consistency between answers to the same questions in 2001 and in 2004, as shown by weighted kappa coefficients between behavioral self-reports (sleepy driving= 0.45, phoning while driving= 0.40, and DWI= 0.51) and by intra-class correlations between reported speeds (in built-up areas=0.49, on rural roads=0.42, and on highways=0.61).

Our study sample is not representative of all French drivers, but its large size and the inclusion of diverse trades and socioeconomic groups throughout France represent an exceptional advantage for the assessment of road behaviors in even larger samples. Although conditions of retirement in our study differed significantly from those of the French population, as participants retired at a relatively young age and did not suffer from substantial financial loss, because of company-funded retirement pensions (21), this situation allowed us to study the influence of work discontinuation on driving behaviors independently of any financial or age-related health issues. Nevertheless, care must be taken before generalization of these results as these participants are specific in terms of age and health.

Overall, our results suggest that normal retirement positively influenced road behaviors, with the exception of DWI. While the reduction in risky speed driving may also be attributed to other factors, such as increased traffic law enforcement, observed discontinuation in sleepy driving and phoning while driving between 2001 and 2004 was clearly facilitated by retirement. The study of

behavioral changes following retirement in a large cohort of road users represents a remarkable opportunity to identify work-related determinants of RTAs and our results suggest that further monitoring and prevention of sleepy driving and phoning while driving among workers is of interest to reduce road burden.

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Competing interests

None declared.

Ethical approval

The study protocol was approved by the French data protection authority Commission Nationale Informatique et Liberté (CNIL).

Authors' Contributions: Junaid Ahmad Bhatti had full access to all of the data in the study and takes responsibility for the integrity of the data and accuracy of the data analysis.

Study concept and design: Lagarde, Lafont, Chiron, Zins.

Acquisition of data: Lagarde, Lafont, Chiron, Zins.

Analysis and interpretation of data: Bhatti, Lagarde, Constant, Salmi.

Drafting of the manuscript: Bhatti, Constant, Lagarde, Salmi.

Critical revision of the manuscript for important intellectual content: Bhatti, Constant, Salmi, Lagarde, Lafont, Chiron, Zins.

Statistical analysis: Bhatti, Lagarde, Salmi, Constant.

Administrative, technical, or material support: Lagarde.

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Table 1. Characteristics of study participants who were professionally active in 2001 and responded to the driving behavior questionnaires in 2001 and 2004 – the GAZEL cohort (N=3 927).

	Total	Retired (2001-04)	Not retired
	N (%)	N (%)	N (%)
Gender and year of birth			
Male			
- 1939 – 43	246 (6.3)	<u>244 (6.2)</u>	<u>2 (0.1)</u>
- 1944 – 48	2337 (59.5)	<u>1779 (45.3)</u>	<u>558 (14.2)</u>
Female			
- 1939 – 43	74 (1.9)	<u>74 (1.9)</u>	<u>0 (0)</u>
- 1944 – 48	472 (12.0)	<u>323 (8.2)</u>	<u>149 (3.8)</u>
- 1949 – 53	798 (20.3)	<u>170 (4.3)</u>	<u>628 (16.0)</u>
Marital Status*			
- Single/divorced/widow	574 (14.9)	<u>293 (7.6)</u>	<u>281 (7.3)</u>
- Living with a partner	3270 (85.1)	<u>2231 (58.1)</u>	<u>1039 (27.0)</u>
Socio-professional categories*			
- Unskilled worker	364 (9.3)	<u>225 (5.7)</u>	<u>139 (3.6)</u>
- Skilled worker	1967 (50.1)	<u>1288 (32.8)</u>	<u>679 (17.3)</u>
- Manager	1593 (40.6)	<u>1074 (27.4)</u>	<u>519 (13.2)</u>
Alcohol consumption habits*			
- None	528 (14.1)	<u>282 (7.5)</u>	<u>246 (6.6)</u>
- Low quantity episodic	1403 (37.3)	<u>893 (23.8)</u>	<u>510 (13.5)</u>
- Low quantity regular	738 (19.6)	<u>518 (13.8)</u>	<u>220 (5.8)</u>
- High quantity episodic	23 (0.6)	<u>8 (0.2)</u>	<u>15 (0.4)</u>
- High quantity regular	1065 (28.4)	<u>769 (20.5)</u>	<u>296 (7.9)</u>
Type of vehicle*			
- Compact/economy	2140 (56.9)	<u>1307 (34.7)</u>	<u>833 (22.2)</u>
- Sedan/family	1558 (41.4)	<u>1132 (30.1)</u>	<u>426 (11.3)</u>
- Sport	62 (1.7)	<u>46 (1.2)</u>	<u>16 (0.5)</u>
Mileage driven in 2001 (km)*			
- < 10 000	892 (23.1)	<u>460 (11.9)</u>	<u>432 (11.2)</u>
- 10 000 – 20 000	1806 (46.9)	<u>1212 (31.5)</u>	<u>594 (15.4)</u>
- > 20 000	1155 (30.0)	<u>880 (22.8)</u>	<u>275 (7.2)</u>

* Data is not available for all of the participants.

Table 2. Changes to safe driving behaviors and positive attitudes toward road safety observed between 2001 and 2004 among those who were professionally active in 2001 – the GAZEL cohort.

	Risk behaviors/ attitudes in 2001	Change to safe behaviors / attitudes between 2001 and 2004			Risk behaviors/ attitudes in 2004	Percentage change in risk behaviors
	N (%)	Total N (%)	Retired N (%)	Not-retired N (%)	N (%)	%
Speed in built-up areas*	1063 (27.6)	847 (79.7)	584 (54.9)	263 (24.8)	311 (8.1)	-70.7
Speed on rural roads*	1547 (40.2)	1057 (68.3)	743 (48.0)	314 (20.3)	726 (18.9)	-53.1
Speed on highways*	1060 (27.7)	880 (83.0)	620 (58.5)	260 (24.5)	249 (6.5)	-76.5
Driving while intoxicated	843 (22.0)	280 (33.2)	209 (24.8)	71 (8.4)	933 (24.4)	+10.7
Sleepy driving	1719 (44.8)	586 (34.1)	429 (25.0)	157 (9.1)	1512 (39.4)	-12.1
Phoning while driving	621 (16.8)	403 (64.9)	272 (43.8)	131 (21.1)	334 (9.0)	-46.2
Relaxing existing regulations	1477 (41.3)	673 (45.5)	460 (31.1)	213 (14.4)	1062 (29.7)	-28.1
Increased traffic enforcement	1709 (48.2)	414 (24.2)	282 (16.5)	132 (7.7)	1785 (50.3)	+4.4

* Risky speed is defined as speed "> 65 km/h" in built-up areas, "> 100 km/h" on rural roads, and "> 145 km/h" on highways.

Table 3. Changes to risky driving behaviors and negative attitudes toward road safety observed between 2001 and 2004 among those who were professionally active in 2001 – the GAZEL cohort.

	Safe behaviors/attitudes in 2001 N (%)	Change to risky behaviors/attitudes between 2001 and 2004			Safe behaviors/attitudes in 2004 N (%)	Percentage change in safe behaviors %
		Total N (%)	Retired N (%)	Not-retired N (%)		
Speed in built-up areas*	2785 (72.4)	95 (3.4)	56 (2.0)	39 (1.4)	3537 (91.9)	+27.0
Speed on rural roads*	2299 (59.8)	236 (10.3)	148 (6.5)	88 (3.8)	3120 (81.1)	+35.7
Speed on highways*	2770 (72.3)	69 (2.5)	47 (1.7)	22 (0.8)	3581 (93.5)	+29.3
Driving while intoxicated	2988 (78.0)	370 (12.3)	259 (8.6)	111 (3.7)	2898 (75.7)	-3.01
Sleepy driving	2119 (55.2)	379 (17.9)	220 (10.4)	159 (7.5)	2326 (60.6)	+9.8
Phoning while driving	3073 (83.2)	116 (3.8)	55 (1.7)	61 (1.9)	3360 (91.0)	+9.3
Relaxing existing regulations	2100 (58.7)	258 (12.3)	160 (7.6)	98 (4.7)	2515 (70.3)	+19.8
Increased traffic enforcement	1838 (51.8)	490 (26.7)	312 (17.0)	178 (9.7)	1762 (49.6)	-4.1

* Risky speed is defined as speed "> 65 km/h" in built-up areas, "> 100 km/h" on rural roads, and "> 145 km/h" on highways..

Table 4. Association between changes to safe driving behaviors and positive attitudes towards road safety (outcome variable) between 2001 and 2004 and retirement over the same period (independent variable) in the GAZEL cohort: Multivariate logistic regression models.

Outcome Variables	Crude models [†]				Adjusted models ^{††}			
	N	Odds ratio	95 % Confidence interval	P [‡]	N	Odds ratio	95 % Confidence interval	P [‡]
Speed in built-up areas*	1063	1.21	(0.88-1.65)	0.24	975	1.27	(0.86-1.87)	0.22
Speed on rural roads*	1547	1.18	(0.94-1.48)	0.16	1414	1.22	(0.92-1.63)	0.16
Speed on highways*	1060	1.16	(0.82-1.64)	0.38	974	0.91	(0.60-1.38)	0.65
Driving while intoxicated	843	0.84	(0.60-1.17)	0.30	768	0.92	(0.62-1.37)	0.69
Sleepy driving	1719	1.54	(1.24-1.92)	<0.001	1557	2.12	(1.61-2.81)	<0.001
Phoning while driving	621	1.83	(1.30-2.56)	<0.001	564	1.74	(1.17-2.61)	0.006
Relaxing existing Regulations**	1477	0.96	(0.77-1.19)	0.70	1318	1.07	(0.82-1.41)	0.61
Increased traffic enforcement**	1709	0.88	(0.69-1.11)	0.28	1562	1.10	(0.82-1.48)	0.53

Note:

* Risky speed is defined as speed "> 65 km/h" in built-up areas, "> 100 km/h" on rural roads, and "> 145 km/h" on highways.

** Odds ratio for change to positive attitude scores in 2004 among those who reported negative attitudes in 2001.

† Unadjusted odds ratio; retired 2001-2004 versus professionally active participants in 2004.

†† Adjusted odds ratio; retired 2001-2004 versus professionally active participants in 2004, adjusted for gender, age (born 1938-43 as reference, 1944-48, and 1949-53), marital status (living with partner and living alone), socio-professional categories (unskilled workers as reference, skilled workers and managers), alcohol consumption (non-consumers as reference, low quantity episodic, low quantity regular, and high quantity episodic and regular), vehicle category (compact/economy as reference, sedan/family, sports/jeep), and annual mileage (<10 000 km/yr as reference, 10 000 – 20 000 km/yr, and >20 000 km/yr).

‡ P-values are reported from the likelihood ratio tests for retirement status.

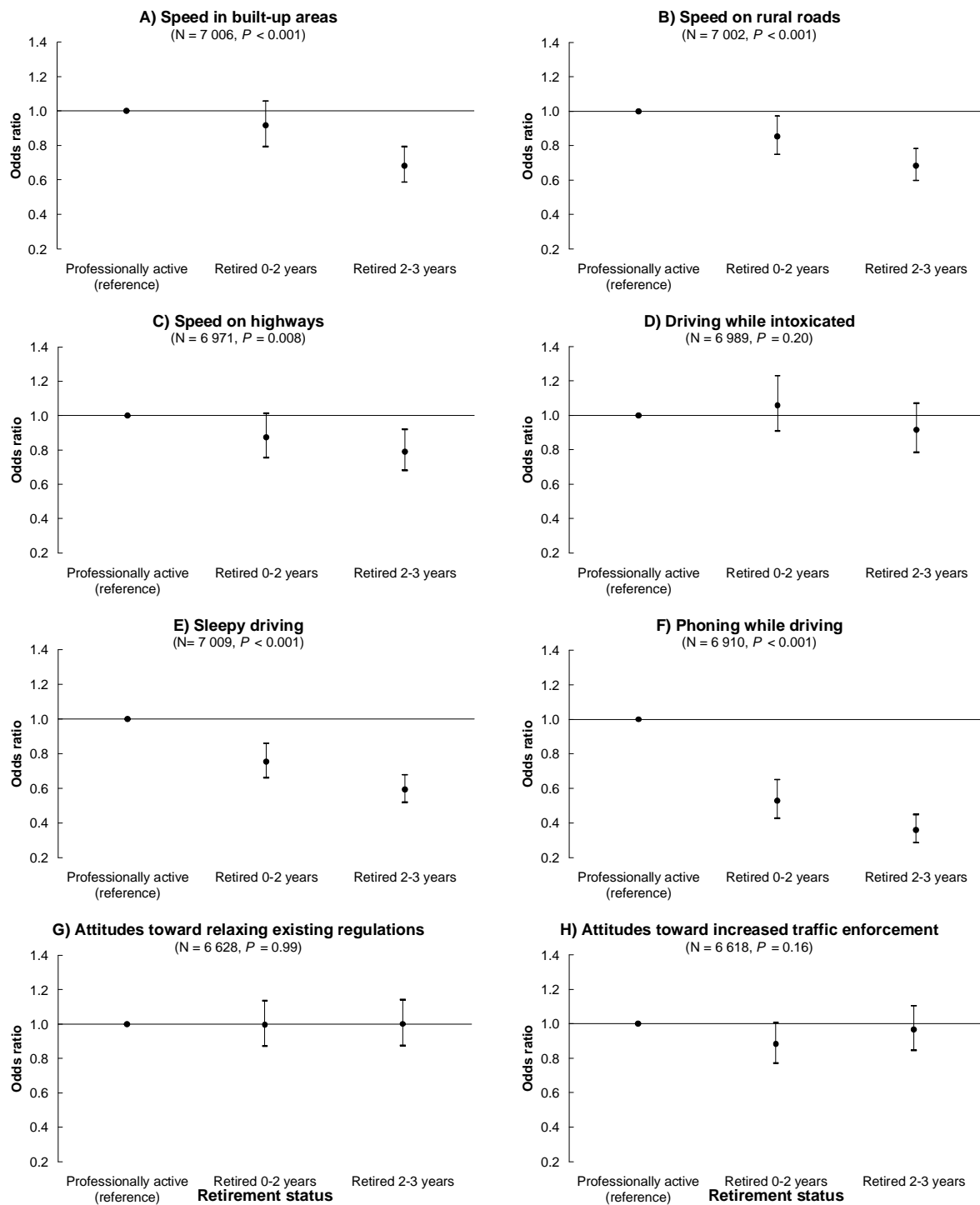


Figure 1. Adjusted odds ratios* and 95% confidence intervals for risky driving behaviors and negative attitudes toward road safety as a function of time since retirement in the GAZEL cohort, 2001

Note:

Professionally active (reference): professionally active at the date of response to questionnaire 2001; Retired 0-2 years: retired less than two years before questionnaire; Retired 2-3 years: retired two years to three years before questionnaire.

* Adjusted for age, gender, marital status, professional categories, alcohol intake, road mobility, and type of vehicle driven in 2001. P-values are reported from the likelihood ratio tests for retirement status.