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# Rule-orientation and adherence to traffic laws among French drivers: an exploratory study

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## **Abstract**

In 2022, 30 million traffic offences were recorded by the enforcement authorities on French roads, resulting in more than 16 million penalty points being deducted from driving licences. Why do French drivers not always comply with the rules of the road? Previous studies have shown that *Attitudes*, *Subjective Norms* and *Perceived Behavioural Control* are strong predictors of the intention to obey traffic laws (Theory of Planned Behaviour, TPB, Ajzen, 1991). In this paper, we investigate drivers' relationship with traffic rules in more depth. We identified several other factors as potential extensions of the TPB in explaining compliance with traffic rules. To test the impact of these dimensions on compliance and to understand the motivations behind French drivers' lack of compliance, we conducted an online questionnaire survey among a representative sample of 1,021 French drivers (mean age: 44.3, 49.9% women). In addition to the TPB measures, we used a combination of existing scales (*Conformity* and *Sensation Seeking*) and exploratory items specifically designed to measure additional components. We named these four distinct components *Conditionality*, *Discourtesy*, *Authority Rejection*, and *Economy*, respectively. Aside from the TPB components, *Conditionality* and *Conformity* predicted intentions to always obey traffic rules; testing the same model on reported drink-driving, we found an effect of *Discourtesy* and *Sensation Seeking*, but not of the TPB components measured at a general level ("towards traffic rules"); whereas *Authority Rejection*, *Economy* and *Attitudes* towards traffic rules were linked to attitudes towards police checkpoints. These findings open up new perspectives for the study of rule orientation in the field of road safety, raise questions about the relevance of conducting general prevention campaigns targeting specific behaviours, and reveal the difficulty perceived by the participants in 'always' respecting the rules of the road.

**Keywords:** Traffic offences, Motivations, Road Safety, Rules compliance, Conditionality

## **Introduction**

In 2023, France recorded 3,398 road fatalities. Since 2013, French authorities have been struggling to reduce this number but are facing a plateau effect (ONISR, 2024). One of the factors which could explain this situation is French drivers' lack of respect for traffic rules (Nallet, Bernard & Chiron, 2010). Despite the introduction of stricter laws and increased supervision by the police, drivers often fail to comply with the rules of the road. In fact, in 2022, 30 million traffic offences were recorded by law enforcement agencies on French roads (ONISR, 2023). These included 16.9 million speeding offences, 7.4 million parking offences, 189,397 hit-and-run offences, 147,713 driving licence offences, 158,682 alcohol-related offences, 117,351 drug-related offences, 528,213 using a mobile phone while driving, 700,036 running red lights or stop signs and 219,634 not wearing a seat belt or helmet. These traffic offences resulted in over 16.3 million penalty points being deducted from French driving licences in 2022 (including over 11.4 million for speeding). Looking beyond France, road traffic crashes are a major public health problem worldwide, with an estimated 1.19 million road traffic deaths in 2021 (WHO, 2023), and greater respect for the rules by drivers could help improve the situation.

One can wonder why drivers do not always obey the traffic rules. Indeed, road traffic offences are so common that in 1960 Ross described them as a "folk crime", which at that time accounted for ten times more deaths than homicides in the United States of America (in France, the ratio was 3.7 more road traffic deaths than homicides by 2022). Some studies have focused on compliance with traffic rules (e.g., Carnis & Blais 2013, 2019), demonstrating the effectiveness of automated speed cameras in deterring speeding among French drivers. From a sociological perspective, Ross (1982; 1984) proposed to refine deterrence theory by distinguishing three aspects of penalties targeted at deterring drink-driving: severity, certainty and swiftness. He concluded that, among those three components, certainty of sanction was the most important.

As a result, the overall general deterrent effect of traffic laws on everyday behaviour such as drink-driving is likely to be low (the certainty of sanction is very low) and raising it would require too many resources (as it would require millions of random breath tests) (Ross, 1984). Ross Homel conducted a detailed study on the deterrent effect of random breath tests on Australian drink-drivers and reached the same conclusion: *“Without an increase in the perceived probability of arrest, penalty increases are not likely to have much deterrent impact”* (Homel, 1988, p.264). Stafford and Warr (1993) re-conceptualized the theory of deterrence by showing the importance of the offender’s experience with the police operation and the functioning of the justice system. In particular, this re-conceptualization introduced two complementary ideas to the theory of deterrence: penalty avoidance (likely to increase recidivism) and vicarious deterrence (the fact of witnessing penalties imposed on others is likely to have a deterrent effect on the witness (and vice versa for the absence of a penalty). Some research (Bates & Anderson, 2021 ; Freeman & Watson, 2006 ; Watling et al., 2010) has studied the impact of these variables on transgressive driving behaviour. For example, Watling et al. (2010) observed a positive correlation between avoidance of punishment (for oneself or others) and intention to drive under the influence of drugs. Freeman & Watson (2006) observed a link between self-avoidance of punishment and intention to drive under the influence of alcohol. Tyler (1997; 2006) explored the possibility of obtaining voluntary compliance from citizens rather than trying to enforce it, with little success. He identified two characteristics of laws that influence citizens' willingness to comply: the perceived legitimacy of the authorities and the perceived morality of the law. Tyler (1997, p.240) found that the perceived legitimacy of authorities is influenced by “judgements about the fairness of the procedures through which those authorities make decisions”. Some studies about perceived legitimacy of authorities have been conducted in the area of road safety. For example, Anderson, Bates & Schaefer (2023) observed a negative correlation between perceived police legitimacy and intention to commit

driving offences in a sample of young Australian drivers. Another study (Watling & Leal, 2012) identified a negative link between perceived legitimacy of traffic law enforcement and intention to commit a driving offence for three illegal driving behaviours (namely drink-driving, speeding and driving while tired). It should be noted that perceived legitimacy of the police (Mazerolle et al., 2012) and traffic law enforcement, such as complying with speed limits (Bates et al., 2022; Bates et al., 2023), can be increased by procedural justice (i.e., police acting fairly). A recent review (Varet et al., 2021) looked specifically at the literature on the relationship between perceived legitimacy of traffic laws and compliance. Yet, only six studies were identified that examined the relationship between perceived legitimacy of traffic rules and compliance. Furthermore, the studies reviewed produced heterogeneous results depending on how legitimacy was defined and measured and on the particular traffic rule considered: *“While perceived legitimacy is generally associated with compliance with traffic rules, its theoretical definitions and measures in the field of road safety are heterogeneous and present validity issues which limit the comparability of studies and so the accumulation of knowledge for both theoretical research and road safety applications.”* (Varet et al., 2021, p.1)

In this study, we have chosen to focus on a number of factors that are (potentially) associated with driving offences. Some of these factors, as detailed below, are derived from previous research that has observed a link with rule-orientation, while others were developed as part of an exploratory approach to complement existing knowledge on the topic.

The Theory of Planned Behaviour (TPB, Ajzen, 1991) showed that *attitudes*, *subjective norms*, and *perceived behavioural control* (PBC) are strong predictors of intention. More specifically, this model was found to be efficient in modelling some illegal behaviours on the road such as speeding (Elliott, Armitage & Baughan, 2003; Forward, 2009; Cestac, Paran & Delhomme, 2011). Typically, studies based on this model consider the three main predictors corresponding to the target behaviour. For example, if the target behaviour is speeding, attitudes towards

speeding are measured. However, this method often ignores the motivational part of the attitude. Do people with a negative attitude towards speeding fear the danger of the behaviour or do they dislike breaking the law? In addition, several attitudes may indirectly reflect a driver's rule orientation, such as attitudes towards other drivers, attitudes towards authority, or general attitudes towards the regulation of behaviour by the law (Tyler, 2006). It is worth investigating these attitudes and their relationship with road traffic violations. In accordance with previous research applying the TPB to traffic violations, we expect in the present study to find strong positive correlations between intentions to comply with traffic laws and each of the three TPB components: attitudes, PBC and subjective norms.

In addition to the TPB model, we investigated drivers' relationship with traffic rules in more depth. We considered several other factors as potential extensions of the TPB in explaining traffic rule compliance, including personality, conditionality, and personal values.

Personality is often found to have an impact on road behaviour (e.g. Cestac, Paran & Delhomme, 2011). One of the most studied constructs in the field of road safety is *Sensation-Seeking*, defined by Zuckerman (1979, p. 10) as "*a trait defined by the need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences*". It is therefore not surprising that sensation-seeking is associated with risk-taking, because it is part of its definition. However, risk-taking can take different forms. For example, when a driver breaks a traffic law, two risks are taken at once: the risk of facing a crash and the risk of being caught and punished by the police because of this illegal action. We can therefore expect sensation-seekers to be more likely to break traffic laws than drivers with low levels of *Sensation-Seeking* (Cestac, Paran & Delhomme, 2011).

"*Conformity* refers to the act of changing one's behaviour to match the responses of others." (Cialdini & Goldstein, 2004). People differ in their tendency to conform depending on several characteristics such as gender (Eagly & Chryala, 1986) and culture (Kim & Markus, 1999).

Moreover, regarding drink-driving behaviour, it has been shown that the higher the respondent's conformity level the stronger the influence of the friends' descriptive norm (Cestac, Kraïem & Assailly, 2015). A conformity trait may thus increase social influence on drivers' compliance (or not) with traffic laws. Moreover, another study (Nordfjærn & Şimşekoğlu, 2014) found a positive relationship between conformity and driving violations.

The concept of the conditionality of traffic rules has been studied in France by Gaymard (2007). This concept suggests that traffic rules are generally respected by drivers, but they sometimes "allow" themselves certain risks and transgressions when they think that the situation "requires" or "allows" it (e.g. "I always stop at a red light, except when I am late for a very important meeting"). The condition thus replaces the prescription of what is normal and/or morally acceptable to do. Gaymard identified some rules that are more conditional than others. For example, obeying speed limits is more conditional than obeying red traffic lights. This means that people tend to find justifications for speeding more easily than for running a red light. In the present paper, we propose to assess whether some people have a tendency to be more or less conditional than others. In other words, we were interested in people's tendency to find good reasons for not obeying traffic laws, as part of their personality. We expected to find a negative correlation between conditionality tendency and complying with rules.

The main dependent variable is the general intention to comply with traffic laws. We also focus more specifically on two other variables linked to traffic law violations and rule orientation, namely attitudes towards roadside speed checks and drink driving. The inclusion of these two other variables is of interest from a methodological point of view (can a general model explain specific behaviour and attitudes?). We chose to target attitudes towards roadside speed checks, which we felt were relevant to a better understanding of the relationship with rules and authority. Drink-driving is an offence that is less often detected by the police than speeding, partly because of the cost of checks (Ross, 1984), but it was present in 22% of fatal crashes in

France in 2023 (ONISR, 2024). The main objective is to explore how the general rule-orientation values, attitudes, personality and four exploratory factors detailed below relate to these illegal and yet quite common behaviours on French roads and the general intention to comply with traffic laws.

## **Method**

### Participants

To test the impact of the general rule-orientation values, attitudes and personality variables on traffic road violations and to understand the motivations behind French drivers' intention to comply (or not) with traffic laws, we conducted an online questionnaire survey among a sample of 1,021 French adult drivers (mean age: 44.3, SD: 14.3, min: 18, max: 83), including 509 women (49.9%). The sample was representative of French drivers in terms of age, sex and geographical distribution (NUTS 1 areas), with a balance of 3/4 urban and 1/4 rural. The data were collected by a polling company using quota sampling. The sample size was set in advance at 1,000 respondents, but the polling company provided slightly more responses than requested to ensure that the quota constraints were met. There was no missing data. When recruited for the online survey, participants were fully informed of the purpose of the study, that their participation was voluntary and anonymous, and that they could stop answering at any time.

### Measures

The measures analysed in this manuscript are taken from a large-scale survey questionnaire (in French) available on OSF (Cestac & Carnis, 2024). Detailed analyses of the full questionnaire have previously been published in a French language technical report. All measures in the questionnaire were administrated using 5-point Likert scales. The design of the TPB measures

followed author's recommendations (Ajzen, 2006). The English versions of the items given below are our suggested translation from the original French version.

We measured *Intention* with a single item: "I intend to make sure that I always obey road safety rules". For comparison purposes, two other outcome variables were measured in the present study: Reported frequency of drink-driving ("In the last year, I have driven while probably over the legal blood alcohol limit ... 1 never – 5 often"), and general attitude towards roadside checks ("Regarding roadside checks in general, we need: 1 less – 5 more").

*Attitudes* were measured with three items ("In general, road safety rules are ... 1 useless – 5 useful", "1 badly designed – 5 well designed", "1 not strict enough – 5 too strict"). However, only the first two items showed a satisfying correlation ( $r=.51$ ,  $p<.01$ ) and were retained to calculate the attitude score.

*Subjective norms* were measured with two items (*descriptive norm*: "Most people important to me (friends, family, etc.) comply with road safety rules", and *injunctive norm*: "Most people important to me (friends, family, etc.) expect me to comply with road safety rules"). The correlation between the two items was satisfactory ( $r=.49$ ,  $p<.01$ ) and a mean score was calculated.

*Perceived behavioural control* (PBC) was measured with two items (*feeling of control*: "It is easy for me to always obey road safety rules", and *self-efficacy*: "I feel capable of always obeying road safety rules"). The correlation between the two items was high ( $r=.70$ ,  $p<.01$ ) and a mean score was calculated.

In addition to the TPB measures, we used a combination of items taken from the Portrait Value Questionnaire (Schwartz et al., 2001), a short version of the Sensation Seeking Scale

(Stephenson et al., 2003), and exploratory items specifically designed for the measure of additional components we wanted to test, as detailed below.

The *Conformism* dimension was taken from the Portrait Value Questionnaire (PVQ-40, Schwartz, 2006, Schwartz et al., 2001, original scale  $\alpha=.63$ ) and was measured with four items ( $\alpha=.78$ ).

*Sensation seeking* was measured with a short scale version (Stephenson et al., 2003, original scale  $\alpha=.66$ ) consisting of 4 items ( $\alpha=.79$ ).

Exploratory factor analyses were conducted on four groups of specific attitude items that we created. These analyses yielded satisfactory factor loadings ( $>.32$  as recommended by Tabachnick & Fidell, 2014, p.702) and Cronbach alphas ( $>.60$ , given the small number of items in each scale) for each group. We named these components respectively *Conditionality*, *Discourtesy*, *Authority Rejection*, and *Economy* respectively.

*Discourtesy* consists of 3 items (see Table 1). A high score on this dimension indicates a personal tendency towards incivility and disrespect for other road users.

Table 1. Exploratory Factor Analysis for *Discourtesy* items

| Item  | Loading |
|---|---------|
| I have already broken the rules of the road at the request of a passenger. [ <i>Il m'est déjà arrivé d'enfreindre les règles de conduite à la demande d'un passager</i> ]   | .70     |
| I sometimes park on a pavement or pedestrian crossing. [ <i>Il m'arrive de stationner en chevauchant un trottoir ou un passage piéton</i> ]   | .77     |
| I sometimes park for a few minutes in a reserved space (disabled parking, cash in transit, bus stop. [ <i>Il m'arrive de stationner quelques minutes sur une place réservée (handicapés, transporteurs de fonds, arrêt de bus)</i> ]) | .80     |

Note: Principal component analysis, one factor, Eigen Value: 1.72, 57% variance,  $\alpha = .63$ . Proposed translation [original item in brackets]. Answers on a 5-point Likert scale labelled: 1. Never – 5. Often.

*Conditionality* consists of 5 items (see Table 2). This corresponds to an individual level of rule conditionality, i.e. a personal tendency to relativise the scope of application of rules, and to often consider certain situations as justifying the possibility of breaking them. A person with a high score on this indicator will therefore have a stronger tendency towards conditionality than someone with a low score.

*Table 2. Exploratory Factor Analysis for **Conditionality** items*

| Item   | Loading |
|--|---------|
| I allow myself to exceed the speed limit when I'm in a hurry. [ <i>Je m'autorise à dépasser les limites de vitesse quand je suis très pressé</i> ]   | .62     |
| In some situations, it is legitimate to break road safety rules. [ <i>Dans certaines situations, il est légitime d'enfreindre les règles de sécurité routière</i> ]  | .69     |
| The police should be lenient in applying road safety rules. [ <i>Les forces de l'ordre devraient faire preuve de souplesse dans l'application des règles de sécurité routière</i> ]  | .68     |
| It is better to drive at the same speed as the traffic rather than scrupulously observe the speed limit. [ <i>Il vaut mieux rouler à la même vitesse que le flux de voitures plutôt que de se conformer scrupuleusement aux limites de vitesse</i> ]             | .68     |
| You should be allowed to cross a white line if you're behind a slow-moving vehicle and no one is coming in front of you. [ <i>On devrait avoir le droit de franchir une ligne blanche si on est derrière un véhicule lent et que personne ne vient en face</i> ] | .63     |

*Note: Principal component analysis, one factor, Eigen Value: 2.18, 44% variance,  $\alpha = .67$ . Proposed translation [original item in brackets].*

*Authority rejection* consists of 5 items (see Table 3). This expresses an individual's tendency to challenge authority and a form of rebellion by questioning the authority of the forces of law and order. A high score on this indicator reflects a higher level of rejection than a low score.

Table 3. Exploratory Factor Analysis for **Authority Rejection** items

| Item  | Loading |
|---|---------|
| When driving near a road checkpoint, I warn oncoming traffic by flashing my headlights. [ <i>Quand je passe à proximité d'un contrôle routier, je préviens les usagers arrivant en sens inverse par un appel de phares</i> ]              | .50     |
| When I am approaching a police checkpoint, I feel ... 1 Not worried at all – 5 Very worried. [ <i>Quand je passe à proximité d'un contrôle routier par les forces de l'ordre, je me sens ... 1 Pas du tout inquiet – 5 Très inquiet</i> ] | .74     |
| When I am approaching a police checkpoint, I feel ... 1 Not at all annoyed – 5 Very annoyed. [ <i>Quand je passe à proximité d'un contrôle routier par les forces de l'ordre, je me sens ... 1 Pas du tout agacé – 5 Très agacé</i> ]     | .81     |
| Roadside speed checks are: 1 Not frequent enough - 5 Too frequent. [ <i>Les contrôles de vitesse sont : 1 pas assez fréquents - 5 trop fréquents</i> ]  | .58     |
| Roadside alcohol checks are: 1 Not frequent enough - 5 Too frequent. [ <i>Les contrôles de l'alcoolémie au volant sont : 1 pas assez fréquents - 5 trop fréquents</i> ]   | .50     |

Note: Principal component analysis, one factor, Eigen Value: 2.05, 41% variance,  $\alpha = .63$ . Proposed translation [original item in brackets].

*Egonomy* consists of 5 items (see Table 4). This corresponds to a personal value orientation, an ideological judgement, a "political" positioning towards the regulation of road behaviour. People with a high score on this dimension have a more flexible vision of travel organisation, i.e. they tend to believe that road behaviour can (and should) be self-regulating. They would prefer drivers to be given more freedom to decide what they consider as an appropriate behaviour for the circumstances they find themselves in, depending on the driving situations they encounter. This state of mind could also reflect a desire for privilege among drivers who feel they have a superior status to others, for example linked to the power of their vehicle.

Table 4. Exploratory Factor Analysis for **Egonomy** items

| Item   | Loading |
|--|---------|
| SPEED cameras are an invasion of privacy. [ <i>Les radars automatiques qui contrôlent la VITESSE sont une atteinte à la vie privée</i> ]   | .83     |
| Automatic RED LIGHT camera checks are an invasion of privacy. [ <i>Les radars automatiques qui contrôlent le FRANCHISSEMENT DES FEUX ROUGES sont une atteinte à la vie privée</i> ]  | .80     |
| Do you agree or disagree with the slogan: "Speed cameras = money-making machines"? [ <i>Êtes-vous d'accord ou non avec le slogan : "radars = pompes à fric !"</i> ]  | .64     |
| The penalties for running a red light (4 points and 135 euros) are ... 1 Not severe enough - 5 Too severe. [ <i>Les sanctions pour un franchissement de feu rouge (4 points et 135 euros) sont ... 1 Pas assez sévères - 5 Trop sévères</i> ]  | .62     |
| The penalties for speeding under 20 km/h (1 point and 68 to 135 euros depending on the location) are ... 1 Not severe enough - 5 Too severe. [ <i>Les sanctions pour un excès de vitesse inférieur à 20 km/h (1 point et 68 à 135 euros selon le lieu) sont ... 1 Pas assez sévères - 5 Trop sévères</i> ] | .54     |

Note: Principal component analysis, one factor, Eigen Value: 2.40, 48% variance,  $\alpha = .72$ . Proposed translation [original item in brackets].

## Results

The data analysed in this manuscript and the SPSS script used are available on OSF (Cestac & Carnis, 2024). Overall, the *Intention to always comply with traffic rules* was relatively high in the sample; it was strongly correlated with *PBC over compliance* (see Table 5). *Conditionality* was negatively correlated with intention but positively correlated with *Authority rejection* and *Egonomy*.

Table 5. Means, standard deviations and correlations between studied variables.

|                                      | Mean (SD)   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   |
|--------------------------------------|-------------|------|------|------|------|------|------|------|------|------|------|------|
| 1. Intention to always comply        | 4.21 (.81)  |      |      |      |      |      |      |      |      |      |      |      |
| 2. Reported drink driving frequency  | 1.48 (.88)  | -.20 |      |      |      |      |      |      |      |      |      |      |
| 3. Attitudes towards roadside checks | 3.56 (1.05) | .24  | -.08 |      |      |      |      |      |      |      |      |      |
| 4. Attitudes to traffic rules        | 4.01 (.78)  | .41  | -.09 | .26  |      |      |      |      |      |      |      |      |
| 5. Subjective norms to traffic rules | 4.07 (.74)  | .40  | -.08 | .08  | .26  |      |      |      |      |      |      |      |
| 6. PBC over compliance               | 3.97 (.84)  | .68  | -.18 | .21  | .41  | .32  |      |      |      |      |      |      |
| 7. Conditionality                    | 2.86 (.83)  | -.41 | .23  | -.20 | -.30 | -.10 | -.33 |      |      |      |      |      |
| 8. Discourtesy                       | 1.52 (.67)  | -.24 | .33  | -.05 | -.11 | -.13 | -.22 | .27  |      |      |      |      |
| 9. Authority rejection               | 2.50 (.77)  | -.30 | .20  | -.41 | -.22 | -.09 | -.27 | .42  | .23  |      |      |      |
| 10. Egonomy                          | 3.00 (.78)  | -.27 | .14  | -.37 | -.31 | -.08 | -.23 | .45  | .15  | .53  |      |      |
| 11. Conformity                       | 3.93 (.74)  | .37  | -.10 | .21  | .33  | .29  | .35  | -.16 | -.17 | -.19 | -.16 |      |
| 12. Sensation seeking                | 2.40 (.93)  | -.25 | .23  | -.13 | -.15 | -.16 | -.20 | .22  | .23  | .20  | .17  | -.29 |

Note:  $N = 1021$ , Standard deviations in brackets,  $p < .01$  for all correlations

Females reported a greater intention to comply with the law (see Table 6). This result is in line with the road safety situation in France, where 83% of alleged perpetrators of fatal crashes are male drivers (ONISR, 2024, p.6). However, in our sample the effect size was small ( $\eta^2=.02$ ). Other sex differences included *PBC* (higher for female drivers), *Egonomy* and *Sensation seeking* (higher for male drivers), with small effect sizes.

Table 6. Means, standard deviations, and one-way ANOVA results, by Sex.

|                                    | Sex            |              | ANOVA by Sex |          |
|------------------------------------|----------------|--------------|--------------|----------|
|                                    | Female (N=509) | Male (N=512) | F            | $\eta^2$ |
| Intention to always comply with TR | 4.32 (.74)     | 4.11 (.87)   | 17.4***      | .02      |
| Reported drink driving frequency   | 1.37 (0.83)    | 1.59 (0.91)  | 17.0***      | .02      |
| Attitudes towards roadside checks  | 3.53 (1.06)    | 3.59 (1.05)  | 0.71         | ns       |
| Attitudes to TR                    | 4.05 (.76)     | 3.96 (.80)   | 3.1          | ns       |
| Subjective norms to TR             | 4.09 (.73)     | 4.06 (.76)   | 0.6          | ns       |
| PBC over compliance                | 4.05 (.80)     | 3.9 (.87)    | 7.8**        | .01      |
| Conditionality                     | 2.81 (.77)     | 2.91 (.88)   | 3.6          | ns       |
| Discourtesy                        | 1.52 (.67)     | 1.52 (.66)   | 0            | ns       |
| Authority rejection                | 2.49 (.74)     | 2.52 (.80)   | 0.4          | ns       |
| Egonomy                            | 2.96 (.74)     | 3.05 (.82)   | 3.4          | ns       |
| Conformity                         | 3.93 (.75)     | 3.93 (.72)   | 0            | ns       |
| Sensation seeking                  | 2.29 (.92)     | 2.51 (.93)   | 14.3***      | .01      |

Note:  $N = 1021$ , Standard deviations in brackets, TR = Traffic Rules, \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$

To test our extended TPB model, we conducted a regression analysis (see Table 7) on our main dependent variable: *Intention to always comply* with traffic rules. Two further regression analyses were conducted for comparison, one on reported *drink-driving behaviour* and the other on *attitude towards roadside checks*.

In the first model five variables are related to *Intention to always comply* with traffic rules. The three variables from the TPB, namely *Attitudes*, *Subjective norms* and *PBC*, contribute to explaining the variance of *Intention*. However, the level of contribution differs between the three components, with a small contribution of *Attitudes*, a medium contribution of *Subjective norms* and a large contribution of *PBC*. In addition, *Conditionality* contributes moderately to the variance of intention, and *Conformity* makes a small contribution. Overall, the model explains a large proportion (55%) of the *Intention* variance. The strong relationship between *PBC* and *Intention to always comply* with road safety rules suggests that the more drivers think it is difficult to always obey the rules, the less they will obey them. *Subjective norms* and, to a lesser extent, *Attitudes*, also contribute positively to explaining the variance in intention, confirming the relevance of the Theory of Planned Behaviour (TPB, Ajzen, 1991) in explaining compliance with traffic rules. *Conditionality* appears to be a complementary predictor that provides a non-negligible addition to the TPB model in explaining the variance of intention. The higher the participant's conditionality score, the lower the likelihood that they will always follow the rules. *Conformity* also contributes, but only to a small extent. The other dimensions we constructed did not contribute to improving the model for this variable. The proportion of variance explained by this model (55%) is quite high given the small number of factors included in the analysis.

Regarding the second model (see Table 7) on driving under the influence of alcohol, the explanatory model is quite different. In fact, there is no relationship with the variables from the TPB, in particular with *PBC*, suggesting that this rule does not pose any difficulty for users.

Indeed, when drinking alcohol, people know when they might exceed the BAC limit, which does not prevent some of them from deciding to drive anyway. The factor that best predicts this behaviour is *Discourtesy*. In our model, therefore, it means disregard for other road users, in other words a form of selfishness on the road, that partly explains drink-driving. Compared to the first model, the link with *Conditionality* remains, but at a lower level than for *Intention to always comply*, which is still consistent with the results observed in previous studies (Gaymard, 2007). The contribution of *Sensation Seeking* in the model is consistent with previous studies linking drink-driving and sensation seeking (e.g., Arnett, 1990). It should be noted, however, that the proportion of variance explained by this model remains relatively low (15%), which underlines the existence of other factors not measured in our study that are related to drink-driving. Furthermore, this model does not follow the TACT (Target Action Context and Time) correspondence principle between the independent variable and dependent variable measures from the TPB (Fishbein, 1997, p.80) which may explain the lack of correlation between them and thus the relatively low level of explained variance.

A third regression model (see Table 7) on attitudes towards police checks was run. This analysis was not designed to test a TPB model, as the dependent variable is an attitude. It was conducted to test the relative contribution of general variables to more a specific variable. We observe a significant effect of the two factors related to personal values towards authority (*Economy* and *Authority rejection*) and the regulation of road behaviour. Above all, this demonstrates the consistency of the construction of the indicators, with negative attitudes towards police checks being a normal consequence of high scores on these dimensions. Several other factors contribute moderately to the regression model, namely: *Attitudes*, *Conformity*, *Conditionality* and *Discourtesy*, which are positively correlated with attitudes towards police stops. Overall, the model explains 23% of the attitude towards roadside checks.

Table 7. Regression analyses of intention to always comply, drink driving, and attitudes towards roadside checks. Standardized coefficients, Coefficients, and Standard Error.

|                                   | I intend to make sure that I always obey road safety rules. |        |     | In the last year, I have driven while probably over the legal blood alcohol limit. |      |     | Regarding roadside checks in general, we need: 1 less - 5 more |        |     |
|-----------------------------------|---|--------|-----|--|------|-----|--|--------|-----|
|                                   | $\beta$   | b      | SE  | $\beta$  | b    | SE  | $\beta$  | b      | SE  |
| Constant                          |   | 1.6*** | .20 |  | .28  | .29 |  | 3.7*** | .33 |
| Attitudes to traffic rules        | .08**   | .08    | .03 | .02  | .02  | .04 | .11**  | .15    | .04 |
| Subjective norms to traffic rules | .18***  | .19    | .03 | .00  | .0   | .04 | -.02   | -.02   | .04 |
| PBC over compliance               | .49***  | .47    | .02 | -.07   | -.07 | .04 | .04  | .05    | .04 |
| Conditionality                    | -.16***   | -.16   | .03 | .09*   | .09  | .04 | .05  | .06    | .04 |
| Discourtesy                       | -.03  | -.03   | .03 | .26***   | .34  | .04 | .07*   | .12    | .05 |
| Authority rejection               | -.03  | -.04   | .03 | .08*   | .09  | .04 | -.30***  | -.41   | .05 |
| Egonomy                           | -.00  | -.00   | .03 | -.00   | -.00 | .04 | -.18***  | -.24   | .05 |
| Conformity                        | .07**   | .08    | .03 | .03  | .03  | .04 | .10**  | .14    | .04 |
| Sensation seeking                 | -.04  | -.03   | .02 | .14***   | .13  | .03 | -.01   | -.02   | .03 |
| Adjusted R <sup>2</sup>           |   | .55    |     | .15  |      |     | .23  |        |     |

Note: \*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$

## Discussion

Our model based on an extended version of the Theory of Planned Behaviour (TPB, Ajzen, 1991) performed well in predicting *Intention to always comply* with traffic rules, with 55% of the variance explained. The *Attitudes* component made only a small contribution to the model, which means that the perceived usefulness and design quality of traffic rules do not have much effect on the intention to comply with them. In fact, most drivers agree that traffic rules are generally useful and well designed. It may therefore not be a crucial point for road safety authorities to increase communication about traffic rules in general, even though it may still be useful for some rules in particular. The *Subjective norms* component was found to have a moderate effect on *Intention*. The social environment needs to be considered when designing general road safety campaigns, bearing in mind that people are influenced by the behaviours and expectations of their relatives when deciding whether to comply with traffic rules. In sum,

regarding the variables from the original TPB model, *Perceived Behavioural Control (PBC)* is the component that makes the greatest contribution to the prediction of intention. The effect of this variable on intention is strong, which means that the more difficult drivers find it to comply with the rules, the less they will comply with them. One can wonder how these results compare with previous studies about traffic violations using the TPB. However, this comparison might be misleading for several reasons. First, to our knowledge no previous study has used the exact same dependent variable as the one used in the present study (*Intention to always comply with traffic rules*). Second, previous literature in the field has shown that the links between the three predictors of the TPB (namely *Attitudes*, *Subjective Norms* and *PBC*) and *Intention* are highly dependent on the specific behaviour considered. For example, Moan & Rise (2011) found that the *PBC* was the strongest predictor of intention not to drink and drive whereas attitude had a weak effect in the model. This result is in contrast with another study by Forward (2009) who found that all three predictors had a similar moderate link with intention to speed. Moreover, even when compared with another study (Cestac et al., 2011) targeting the same kind of behaviour (e.g., speeding), results are found to be quite different, with *Attitude* being the strongest predictor of *Intention*, above *Subjective Norms* and *PBC*. We can deduce from these examples that those links not only depend on the target behaviour but are also sensitive to the specific measurement method and potentially to several other non-measured factors such as the sample nationality or the time of measurement. Finally, any difference (depending on the comparison study) between the results found in the present study and another somehow comparable one could also be attributed to the level of generality of measured components. Indeed, most studies based on the TPB target very precise behaviours (e.g., intended frequency of driving at a preferred specific speed in the next 12 months in the following situation “You are driving straight ahead in a lane where the speed limit is 90 km/h and traffic is flowing”, Cestac et al., 2011). Using precise behaviours is recommended by the founders of the TPB

(Fishbein, 1997, p.80) to achieve high levels of explained variance. However, this recommendation has been criticised as leading to tautological relationships between variables (Giger, 2008). Moreover, being too precise about the target behaviour has its counterpart in its practical application and its usefulness for designing road safety interventions. Indeed, it is not feasible to design such specific interventions for each such specific behaviour. Practitioners need information about broader scope behaviours, that is, they need a greater “predictive distance” even though it results in lower predictive power. In conclusion, the choice made in the present study to apply the TPB to a broad scope target behaviour (i.e., *always complying with traffic laws*) could also be a source of difference in the results found compared with previous studies targeting more specific behaviours.

Let us now return to the link observed between *PBC* and the *intention to always obey traffic rules*. How can we interpret this relationship? One of the possible explanations would be that the complexity of the rules may discourage drivers from complying with them. Some drivers may find it too difficult to deal with several simultaneous and sometimes conflicting instructions while driving. Furthermore, the driving situation is dynamic and constantly evolving depending on the environment and interactions with other road users. Therefore, even when they are motivated to comply, drivers may find it difficult to maintain their motivation and attention at all times and never violate a traffic rule. This point would need to be confirmed by further research, but if confirmed it would be interesting from a road safety intervention perspective, as it implies that rule violations are not always fully intentional and may result from task difficulty (see Fuller, McHugh & Pender, 2008). Simplifying the rules could therefore be a good approach to increasing compliance. Consideration can also be given to helping drivers comply by developing and disseminating in-vehicle assistance devices, such as systems that warn the driver if he or she is exceeding the speed limit or driving too close to the vehicle in front. Authorities could also invest some effort in education to better explain complex

mechanisms to drivers, such as the elimination of alcohol from the blood with time or stopping distance depending on vehicle speed, tyre wear, actual road conditions, and alertness, which affects reaction time. Another possible explanation for the observed relationship between *PBC* and *intention to always obey traffic rules* could be that in certain circumstances (e.g. when a driver is in a hurry) obeying the rule is perceived as too difficult, which would likely justify breaking the rule. The data collected in the present study do not allow a categorical statement to be made on the interpretation of the relationship between *PBC* and *intention to always obey the rules*, and further research on this point will be necessary to better understand the processes involved in this relationship. Among the additional variables tested, *Conformity* and *Conditionality* contributed significantly to the variance explained by the model. The higher the conformity score of the drivers in our sample, the higher the intention to comply. This effect is not surprising but it is quite small, which means that being conformist is not a sufficient condition to generate the intention to always comply with traffic rules. The stronger contribution of conditionality to the model shows that this intention may be sensitive to driving situations and conditions, depending on the driver's tendency to find excuses for not complying. This point raises the question of 'always' complying or not. Most drivers would agree that they generally obey traffic laws most of the time, but most of them would admit that sometimes they have a good reason for not complying. The problem is that it is on these occasions that road crashes can occur. Failure to comply with traffic rules increases the risk of facing a crash. It seems important for the authorities to improve their knowledge of these situations and to understand why drivers find the rule inappropriate or inapplicable to these particular occasions. This knowledge would then make it possible to offer alternatives to drivers faced with such situations so that they can deal with them without breaking the traffic rules.

For comparison, our general model was tested on a more specific offence: reported drink-driving frequency. First, the model performed much worse in explaining *Reported drink driving*

(explaining only 15% of the variance) than *Intention to always comply with traffic rules*. The principal reason for this discrepancy was likely due to the utilisation of a general model to predict a specific behaviour. Furthermore, even if it has been demonstrated in the field of road safety that intentions and behaviours are strongly correlated (Armitage, Rodwell, & Lewis, 2022; Castanier, Deroche, & Woodman, 2013), other factors may intervene and prevent intentions from becoming actual behaviours. However, the discrepancy lies not only in the predictive efficacy of the model, but also in the variables associated with the offence in question: *Conditionality*, *Discourtesy*, and *Sensation Seeking*. The contribution of *Conditionality* in the model suggests that drivers who tend to find excuses for not complying with traffic rules in general also tend to drink and drive more often. This link only reaches a low level though, but it would still be interesting to explore the conditions in which some drivers find it acceptable to drive after they have drunk more alcohol than permitted by the law. However, the relationship is weak, but it would be interesting to explore the conditions under which some drivers find it acceptable to drive after having consumed more alcohol than the legal limit. The relationship between drink-driving and sensation-seeking is already known (Arnett, 1990) and is confirmed by the model. This relationship suggests that drivers are more likely to drink and drive when they are prone to seeking immediate pleasure and thus failing to self-control their behaviour. The contribution of *Discourtesy* in the model is consistent with this finding. Indeed, high scores on this variable reflect a lack of consideration for other road users and thus, in a sense, selfishness behind the wheel. Sensation-seekers typically have low levels of self-regulation of their driving behaviour (Lazuras et al., 2022) and it may be a good approach for public authorities to develop life skills education programmes to increase drivers' self-regulation skills.

In the third model, the two main predictors of *Attitudes towards roadside checks* were *Authority rejection* and *Egonomy*, with an overall moderate level of explained variance (23%). Some

drivers simply do not like to be checked. The more they feel they are subject to too many traffic rules (*Egonomy*), and the more they reject authority, the lower their attitude to roadside checks. This makes sense because *Egonomy* and *Authority rejection* can be seen as proxies for perceived legitimacy of traffic rules. However, as shown by our first model, these beliefs do not seem to be directly related to lack of compliance with traffic rules. This may explain why previous work investigating the relationship between perceived legitimacy of rules has yielded mixed results, depending on the specific rule considered (Varet et al., 2021). It is possible that *Egonomy* and *Authority rejection* play an indirect role through *Conditionality*, with which they are strongly correlated. In this case the authorities should maintain or even increase their communication efforts during the implementation of new measures.

### **Contributions and limitations**

This contribution brings new knowledge about understanding of the offending intention with a specific application to France. Previous studies have focused more on the establishment of a gap existing between legal norms and social norms and its interaction (Moget-Monseur and Biecheler Fretel, 1985) or the characterisation of offending behaviours (Carnis, 2013). More recently additional contributions have questioned the importance of the legitimacy of rules for understanding attitudes towards Highway Code rules (Varet et al., 2021). These sparse contributions are low in number compared to the traditional way of investigating rule violation in terms of risk and behaviour. So, a better understanding of drivers' values is needed for understanding their motives to violate or not violate the legal rules. This contribution shows that considering discourtesy, the rejection of authority, conformity, egonomy and sensation seeking could help in understanding the intention of non-compliance with road rules. This contribution suggests that additional research is needed to gain a better understanding of the motives of violation and how to deal with them in order to formulate an efficient traffic

enforcement policy. This study presents some methodological limitations. First, this research has to be confirmed as an exploratory investigation, which needs further replications and additional studies. Consideration could be given as to whether some differences or convergences exist among some categories of road rules (behavioural ones such as speeding, drink driving, etc., or administrative ones such default of insurance coverage, etc.) Second, some significant results presented here may be related to the large sample studied and therefore need to be confirmed by further research. Our primary outcome measure was intention, not behaviour. Although intentions have often been shown to be strongly related to voluntary behaviour (Sheeran, 2002), it is possible that compliance with traffic rules is not entirely voluntary and therefore may not be a reasoned course of action. Further research is needed to determine the extent to which intentions to speed are predictors of speeding behaviour. Third, another limitation relates to the use of self-report measures, which inevitably involve a degree of subjectivity and the risk of social desirability bias, especially in questionnaires related to traffic violations (Lajunen & Summala, 2003). Although an attempt was made to limit this bias by assuring participants that their responses would remain anonymous, the results of the present study must still be treated with caution. Fourth, *Intention* was measured through a single item. Probably, a further investigation could consider additional items.

Finally, the present study includes several exploratory items that we have grouped into four original distinct ad hoc dimensions. Some of these dimensions did not exceed the threshold usually considered acceptable for internal consistency ( $\alpha > 0.7$ ). However, given the exploratory nature of these measures and the limited number of items (three items for one and five items for the other two), we considered that an alpha threshold of 0.6 was still acceptable for these indicators in the present study. Nevertheless, these dimensions and their potential interest for understanding how drivers offend would need to be confirmed in further research.

## **Conclusion**

The main conclusion of this study relates to the strong relationship between *PBC* over compliance with traffic rules and the *intention to always comply*. This highlights a difficulty that drivers may face in consistently and adequately complying with traffic rules. Authorities could therefore increase overall compliance with traffic rules by simplifying them and/or providing support to help drivers.

In addition, we found different models depending on the offence considered; a global response may not be efficient enough to deal with each specific offence process. Further research should be carried out to confirm this and possibly identify the processes involved in each type of offence. Authorities could then design their prevention and training programmes to target the specific variables involved in each specific offence they wish to prevent.

Other public policy recommendations that could be considered as a result of this study (although their potential effectiveness needs to be tested) include: communicating about specific rules rather than rules in general, increasing knowledge about situations in which drivers find it acceptable not to follow the rule, and developing skills training programmes to increase drivers' self-regulatory abilities.

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