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1 **Risk comparative judgments while driving a car among competitive road cyclists and**  
2 **non-cyclists**

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1 **Abstract**

2       This study examines risk comparative judgments and risky behaviors while driving a  
3 car among competitive road cyclists ( $n = 119$ ) and among controls (i.e., drivers who do not  
4 have almost no cycling experience,  $n = 142$ ). A questionnaire-based cross-sectional survey  
5 was conducted. Results showed that competitive road cyclists assess their own  
6 vulnerability to be involved in an accident while riding (VAR) as being lower than that of  
7 the average cyclists, and their abilities to manage risks while riding (AMRR) as being  
8 higher. They assessed their own vulnerability to be involved in an accident while driving a  
9 car (VAD) as being lower than that of the average drivers, and their own quality of  
10 reflexes while driving a car (QRD) as being higher. Their tendency to express comparative  
11 optimism while assessing their comparative VAD and QRD was higher than that of  
12 controls. They also reported more prudent behaviors while driving a car than did controls.  
13 Results are discussed, as well as implications in terms of prevention.

14

15 **Key-words:** Abilities to manage risks; Vulnerability; Quality of reflexes; Risky driving;  
16 Road traffic accident; Comparative optimism.

17

18 **Running head:** risk comparative judgments among cyclists

1 Risk comparative judgments while driving a car among competitive road cyclists and non-  
2 cyclists

### 3 1. Introduction

4 In the field of road safety, numerous studies have examined drivers' risk  
5 comparative judgments to describe people's tendency to assess themselves as different  
6 than the average regarding their competence while driving, or regarding their vulnerability  
7 to road accident (Delhomme, 2000; Sundström, 2008). Most of them have shown that  
8 people tend to perceive themselves to be less vulnerable to traffic accidents than are their  
9 peers (Finn & Bragg, 1986; Guérin, 1994; Guppy, 1993; Harré, Susan, & O'Neill, 2005;  
10 Rutter, Quine, & Albery, 1998), to think they are more skillful than their peers are while  
11 driving (Harré et al., 2005; Horswill, Waylen, & Tofield, 2004), or to believe they have  
12 better reflexes than average (Delhomme, 1991). Such a tendency has been called as  
13 *comparative optimism* (CO; Harris & Middleton, 1994) or *unrealistic optimism*  
14 (Weinstein, 1980). While these terms have often been conflated in research on risk, in this  
15 investigation we preferred to use the term CO, considering the belief that one's risk is  
16 below average, without regard to whether this belief is correct. Hence, whereas the  
17 standard method of measuring unrealistic optimism can establish bias at the group level,  
18 there is no way to know which members of the sample are biased. Some individuals who  
19 rate their risk as below average may have a risk factor profile that puts them at below  
20 average, so it would be inappropriate to label them as *unrealistic* (Weinstein & Klein,  
21 1996; see also Radcliffe & Klein, 2002, for a review).

22 Some studies have demonstrated that CO was not systematic (Armor & Taylor,  
23 1998; Causse, Delhomme, & Kouabenan, 2005; Meyer & Delhomme, 2000), as people  
24 may assess their own risks as similar as those of others. People may also express a

1 comparative pessimism (CP), assessing their own risks as higher than those of others,  
2 especially when they feel they have little personal control over risks (Harris, 1996;  
3 McKenna, 1993).

4 Risk comparative judgments are assumed to be a motivating factor for behavior  
5 change in a number of theoretical models (Weinstein, 1989). From a practical point of  
6 view, they may be related to the way people perceive safety recommendations and adopt  
7 cautious behaviours (Chappé, Verliac, & Meyer, 2007; Perloff & Fetzer, 1986). In the  
8 field of road traffic, some relationships have been found between CO while driving and  
9 the propensity to engage in risky driving (Klein, 1997; McKenna, Stanier, & Lewis, 1991)  
10 and accident involvement (Sümer, Özkan, & Lajunen, 2006). Given that CO may  
11 undermine the effectiveness of educational efforts (Weinstein, 1987), and in order to  
12 improve prevention efficacy, it is important to examine how drivers assess their risks  
13 while driving in comparison with those of other drivers, as well as factors associated with  
14 such risk comparative judgments. Previous studies have revealed a link between risk  
15 comparative judgments and age (e.g., Finn & Bragg, 1986; Matthews & Moran, 1986),  
16 perceived control of the situation (DeJoy, 1989; Delhomme, 1991, 2001; Harris, 1996;  
17 McKenna, 1993), and experience of road accident (Rutter et al., 1998), though this  
18 relationship is still debated (Causse, Kouabenan, & Delhomme, 2004; Lin, Huang,  
19 Hwang, Wu, & Yen, 2004).

20 Our study examined the role of another type of road experience, that is road cycling,  
21 on both risk comparative judgments and risky behaviors while driving a car. Such a link  
22 has already been observed among motorcyclists, who were better at hazard perception  
23 while driving a car than were non-motorcycling car drivers, but who did not differ on risk-  
24 taking behaviors while driving a car (Horswill & Helman, 2003). But so far as we know,

1 whether or not cycling experience is related to risk perception and risky behaviors while  
2 driving has not been studied before.

3 Road cycling involves important risks of being involved in a road accident in  
4 interaction with other road users, and even alone (Thompson & Rivara, 2001). Most road  
5 accidents involve serious injuries or even deaths for the cyclists who have almost no  
6 protection against impacts. According to Thélot (2003), about 250 cyclists die each year in  
7 France in a road accident. Bicycle-related injuries may also result from collisions between  
8 practitioners when bunching together, particularly when participating in competition.

9 While studies have examined cyclists' risk perception when riding (e.g. Guthrie,  
10 Davies, & Gardner, 1998; Harkey, Reinfort, & Knuiman, 1998; Martha & Griffet, 2007;  
11 Moller & Hels, 2008; Parkin, Wardman, & Page, 2007; Titze, Stronegger, Janschitz, &  
12 Oja, 2007), no one has examined how cyclists assessed their abilities to manage risks  
13 inherent to road environment while riding (AMRR), or their vulnerability to be involved in  
14 a road accident while riding (VAR), in comparison to those of the average cyclist.  
15 Moreover, to our knowledge, no studies have investigated how cyclists assess their quality  
16 of reflexes while driving a car (QRD), or their vulnerability to be involved in road  
17 accident while driving a car (VAD), in comparison to those the average driver. The  
18 present study aimed to address these issues of risk comparative judgments among a  
19 population of competitive road cyclists.

20 Since they are used to facing and anticipating the potential dangers inherent to road  
21 traffic on fast roads, we first hypothesized that competitive road cyclists would assess their  
22 VAR as being lower than that of the average cyclists (Hypothesis 1a), and their AMRR as  
23 being higher (Hypothesis 1b). They would assess their VAD as being lower than that of  
24 the average drivers (Hypothesis 2a), and their QRD as being higher (Hypothesis 2b). Their

1 tendency to express CO, while assessing their comparative VAD and QRD, would be  
2 higher than that of controls (i.e., drivers who have almost no cycling experience;  
3 Hypothesis 3). Competitive road cyclists would adopt more prudent behaviors while  
4 driving a car than controls (Hypothesis 4).

## 5 2. Method

### 6 2.1. Participants

7 This study was approved by the local university ethics committee of the University  
8 of the Mediterranean in Marseilles (France). We surveyed 261 male adults, differentiated  
9 according to their cycling activity: competitive road cyclists ( $n = 119$ ) practicing on the  
10 road in a frequent way (i.e., at least twice a week, at least one hour each time), versus non-  
11 cyclists who represented the control groups. The non-cyclists participants were divided  
12 into two groups according to their sporting activity, in order to control the putative link  
13 found by previous studies (Martha & Griffet, 2007; Nattiv, Puffer, & Green, 1997)  
14 between sporting activity and risky attitudes and behaviors in the field of road traffic. The  
15 non-cyclists sportspeople group ( $n = 53$ ) was made of swimmers, badminton players,  
16 fitness enthusiasts and dancers. The non-sportspeople group ( $n = 89$ ) was made of students  
17 and adults representative of the different French socio-professional categories.

18 The sample was on average 37.7 ( $SD = 9.6$ ) years old, with no significant difference  
19 between the three groups ( $F(2, 260) = 2.51, p = 0.07$ ). Among the whole sample, 8% ( $n=21$ )  
20 have been involved in at least one road traffic accident over the last 3 years while driving  
21 a car, with no significant differences ( $Chi^2(2) = 2.11, p = 0.09$ ) between the competitive  
22 road cyclists (7%,  $n=9$ ), the non-cyclists sportspeople (8%,  $n=7$ ) and the non-sportspeople  
23 (9%,  $n=5$ ). Among competitive road cyclists, 11% ( $n=13$ ) have experienced a road traffic  
24 accident while riding.

1    2.2. *Procedure*

2           All the competitive road cyclists and the non-cyclists sportspeople were contacted on  
3    their club or other practice site in Marseilles where we could “enter in” easily thanks to  
4    ones of our colleagues who worked there as teachers. The participation of 126 competitive  
5    road cyclists and 65 non-cyclists sportspeople followed on from an oral invitation made by  
6    ourselves or by their club managers on their practice sites. We asked for their informed  
7    consent to fill out a questionnaire on the theme of daily activities like sport and driving,  
8    among adults who had a driving license. The response rate was difficult to quantify since  
9    we did not know how many participants were present each time we followed this  
10   procedure. The sportspeople filled out the questionnaire on their practice site and returned  
11   it into a large box containing others’ questionnaires to preserve respondents’ anonymity.  
12   Among the non-cyclists sportspeople, 7 participants were excluded from the analyses as  
13   they reported riding sometimes a bicycle.

14           The same data collection method was used for the non-sportspeople, selected to  
15   capture a range of job categories. They were invited to complete the questionnaire at work  
16   locations (offices, shops, classrooms etc.). Again, response rate was difficult to quantify.  
17   Among the 136 participants who filled out the questionnaires, 19 were excluded as they  
18   reported practicing sport. Finally, as we removed 20 uncompleted questionnaires, the  
19   analyses were based on data from 261 respondents.

20   2.3. *Material*

21           The questionnaire was divided in five sections. The first addressed background  
22   details of the respondents including age and sporting activity(ies). Participants were asked  
23   to report their frequency of practice, their competitive participation, and the number of  
24   years of experience with a given sport.



1           The second section listed four questions related to risk comparative judgments while  
2 driving a car. Participants' perceived comparative VAD and QRD were obtained by the  
3 direct method for measuring risk comparative judgments, that is the use of a single item  
4 which asks the respondents to compare themselves directly to the average. This use of a  
5 single item has been validated in surveys investigating perceived comparative VAD and  
6 QRD (e.g., Delhomme, 1991; Rutter et al., 1998). We measured perceived comparative  
7 VAD and QRD by asking participants to compare themselves to both a specific (Q1) and a  
8 non-specific referent (Q2), by answering the following: (Q1) 'In your opinion, what is  
9 your probability of being involved in a road traffic accident in comparison with that of the  
10 average same-age and same-sex French driver?'; 'In your opinion, how is your QRD in  
11 comparison with that of the average same-age and same-sex French driver?'; and (Q2) 'In  
12 your opinion, what is your probability of being involved in a road traffic accident in  
13 comparison with that of the average same-age and same-sex French sportsperson driver?';  
14 'In your opinion, how is your QRD in comparison with that of the average same-age and  
15 same-sex French sportsperson driver?'.  
16

17           To express their perceived comparative VAD, participants answered on a scale,  
18 ranging from -3 ('much less likely') to +3 ('much more likely'). We reverse-coded  
19 responses, so that scores higher than '0' correspond with CO, and scores lower than '0'  
20 correspond with CP. To express their perceived comparative QRD, participants answered  
21 on a scale ranging from -3 ('much worse') to +3 ('much better'). Thus, scores lower than  
22 '0' correspond with CP and scores higher than '0' correspond with CO. Scores close to  
23 zero indicate that participants rate their VAD or their QRD as being similar to those of the  
aforementioned referents.

1           In the third section, self-reported risky behaviors while driving a car were evaluated  
2 by the average score on seven items derived from the risk behavior scale used by Ulleberg  
3 and Rundmo (2003), after a factor analysis (in the present study, *Cronbach's* alpha =  
4 0.78). These items were: 'How often do you exceed speed limits by more than 25 km/h on  
5 a highway; on a secondary road; in town?'; 'How often do you overtake on a blind bend  
6 on country roads?'; 'While driving, how often do you use cell-phone while driving  
7 without wearing an earphone?'; 'How often do you drive with a blood alcohol level  
8 beyond the authorized threshold (0.5g/l)?'; and 'How often do you accelerate when the  
9 traffic light turns to orange?'. Answers were given on a scale, from 1 indicating 'never' to  
10 7 indicating 'always', so that a high score on the scale indicates a high degree of self-  
11 reported risky driving.

12           The fourth section consisted of two questions about the number of road traffic  
13 accidents necessitating medical attention that participants had experienced over the last 3  
14 years while driving a car and while riding a cycle. While this measure likely excludes a  
15 number of incidents not requiring medical attention, it also minimizes the problems raised  
16 by different subjective interpretations of what constitutes an accident.

17           In the last section, risk comparative judgments were measured in the specific context  
18 of cycling. As it concerned only the competitive road cyclists group, this section was the  
19 last one in order to preserve homogeneity of the sections order for all the respondents.  
20 Perceived comparative VAR was measured by the following item: 'In your opinion, what  
21 is your probability of being involved in a road accident while riding in comparison with  
22 that of the average same-age and same-sex French cyclist?'. Participants answered on a  
23 scale, ranging from -3 ('much less likely') to +3 ('much more likely'). We reverse-coded  
24 responses, so that scores higher than '0' correspond with CO, and scores lower than '0'

1 correspond with CP. Then perceived comparative AMRR was measured by the following  
2 item: ‘In your opinion, how is your AMRR in comparison with that of the average same-  
3 age and same-sex French cyclist?’. Participants’ responses were given on a scale ranging  
4 from –3 (‘much worse’) to +3 (‘much better’). Thus, scores lower than ‘0’ correspond  
5 with CP and scores higher than ‘0’ correspond with CO. Scores close to zero indicate that  
6 participants rate their VAR or their AMRR as being similar to those of the average  
7 cyclists.

#### 8 *2.4. Statistical analyses*

9 Pearson correlations were computed to identify the relations among all measures of  
10 risk comparative judgments, self-reported risky driving, and accident experiences, among  
11 the three groups of participants. One-sample *t*-tests were carried out to measure whether  
12 participants’ perceived comparative AMRR, VAR, QRD and VAD scores were higher,  
13 lower, or close to zero. We compared the three groups of participants with regard to  
14 perceived comparative QRD, perceived comparative VAD, and self-reported risky  
15 behaviors. For this purpose, we conducted a multivariate analysis of variance  
16 (MANOVA). Then, univariate analyses (ANOVAs) were carried out to test which  
17 dependent variables were responsible for the differences in mean vectors that were shown  
18 in MANOVA. ANOVAs were supplemented by pairwise comparisons with Tukey-  
19 Kramer test, recommended for the situation of unequal sample sizes (Toothacker, 1993) to  
20 determine differences between groups.

### 21 3. Results

22 Correlations among the measures are shown in Table 1. Among competitive road  
23 cyclists, perceived comparative AMRR was related to perceived comparative VAR ( $r =$   
24  $0.55, p < 0.001$ ), as well as to perceived comparative VAD ( $r \geq 0.23, p < 0.05$ ) and

1 perceived comparative QRD ( $r \geq 0.23, p < 0.05$ ). Among the three groups of participants,  
2 perceived comparative QRD was related to perceived comparative VAD ( $r \geq 0.28, p <$   
3  $0.01$ ). There was no significant relationship between self-reported risky driving, accident  
4 experiences and risk comparative judgments.

5 Insert Table 1

6 Competitive road cyclists' scores on risk comparative judgments while riding are  
7 provided in Table 2. Competitive road cyclists assessed their VAR as being lower than  
8 that of the average same-age and same-sex cyclist ( $t = 3.35, p < 0.01$ ), and their AMRR as  
9 being higher ( $t = 3.20, p < 0.01$ ).

10 Statistical differences according to the group in risk comparative judgments and self-  
11 reported risky behaviors while driving a car are also provided in Table 2. MANOVA  
12 revealed significant group differences on the dependent variables (Wilks' Lambda  $F_{(10,$   
13  $xxx) = 4.3, p < 0.01$ ). There was a difference between the three groups in the tendency to  
14 express CO regarding the perceived comparative VAD in comparison with that of both the  
15 non-specific ( $F_{(2, 260)} = 4.8, p < 0.01$ ) and the specific referent ( $F_{(2, 260)} = 4.5, p < 0.01$ ).  
16 The tendency to express CO was higher among the competitive road cyclists than among  
17 non-cyclists sportspeople ( $p < 0.01$ ) and the non-sportspeople ( $p < 0.01$ ). More precisely,  
18 the non-sportspeople and non-cyclist sportspeople groups assessed their VAD as being  
19 similar to that of the non-specific referent ( $t \leq 1.7, p > 0.09$ ) and that of the specific  
20 referent ( $t \leq 1.0, p > 0.21$ ). Competitive road cyclists assessed their VAD as being lower  
21 than that of the non-specific referent ( $t = 5.7, p < 0.001$ ) and that of the specific referent ( $t$   
22  $= 4.6, p < 0.001$ ).

23 The three groups of participants assessed their QRD as being higher than that of the  
24 non-specific referent ( $t \geq 8.4, p < 0.001$ ). There was a difference between the three groups

1 in perceived comparative QRD in comparison with that of the specific referent ( $F_{(2, 261)} =$   
2 5.9,  $p < 0.01$ ). Only competitive road cyclists expressed CO, assessing their QRD as being  
3 higher than that of the specific referent ( $t = 6.6$ ,  $p < 0.001$ ). The non-cyclists sportspeople  
4 and the non-sportspeople assessed their QRD as being similar than that of the specific  
5 referent ( $t \leq 0.11$ ,  $p > 0.14$ ).

6 There were significant differences between the three groups in self-reported risky  
7 behaviors while driving a car ( $F_{(2, 259)} = 5.0$ ,  $p < 0.05$ ), as competitive road cyclists  
8 reported less risky behaviors while driving a car than the non-sportspeople ( $p < 0.01$ ) and  
9 the non-cyclists sportspeople ( $p < 0.01$ ).

#### 10 4. Discussion

11 As we noted earlier, CO has been shown in several domains of daily life (Hoorens,  
12 1996; Van der Pligt, 1998; Weinstein & Klein, 1996), and has frequently been shown  
13 among drivers (e.g., Delhomme, 2000; Finn & Bragg, 1986; Matthews & Moran, 1986) as  
14 well as among motorcyclists (Rutter et al., 1998). The aim of this study was to examine  
15 whether or not CO also occurs in competitive road cyclists who practice on fast roads in a  
16 frequent way, and thus who are used to facing and anticipating the potential dangers  
17 inherent to road traffic.

18 Our results showed that competitive road cyclists expressed CO regarding their risk  
19 exposure in both transportation modes: riding a cycle and driving a car. Indeed, they  
20 assessed their abilities to manage risks inherent to road environment while riding  
21 (AMRR), and their vulnerability to be involved in a road accident while riding (VAR) as  
22 being respectively higher and lower than those of the average cyclist; this supported  
23 Hypothesis 1a and Hypothesis 1b. Competitive road cyclists probably attribute to the  
24 average cyclist less experience of road cycling and thus less AMRR than they think they

1 have themselves. They also assessed their vulnerability to be involved in a road accident  
2 while driving a car (VAD) as being lower than that of both the specific referent (i.e., the  
3 average same-age and same-sex French sportsperson driver) and the non-specific one (i.e.,  
4 the average same-age and same-sex French driver, and assessed their quality of reflexes  
5 while driving a car (QRD) as being higher; this supported Hypothesis 2a and Hypothesis  
6 2b.

7       Such a CO was not observed among the non-cyclists sportspeople and the non-  
8 sportspeople, who composed the controls groups. They assessed their VAD as being  
9 similar to that of both the specific and the non-specific referent. However, their perceived  
10 comparative QRD differed according to the specificity of the referent, since they assessed  
11 their QRD as being higher than that of the non-specific referent, and were less optimistic  
12 when assessing their QRD in comparison with that of the specific referent. This result  
13 supports those found by previous studies (Helweg-Larsen & Shepperd, 2001) who showed  
14 that the more distant or ambiguous is the referent, the greater the respondents' tendency to  
15 express CO.

16       Thus, as a whole, competitive road cyclists' tendency to express CO while assessing  
17 their comparative VAD and QRD, was higher than that of the control groups, which  
18 supported Hypothesis 3. We can speculate that competitive road cyclists' tendency to  
19 express CO while driving a car is linked to their perceived good deal of knowledge and  
20 experience about road traffic environment, inherent to their competitive cycling  
21 experience. This idea would be supported by the moderate but significant link we found  
22 among competitive road cyclists, between their perceived comparative risks while driving  
23 a car and while riding a cycle. This suggests that competitive road cyclists are self-  
24 confident in their abilities to manage risks in both transportation modes: driving a car and

1 riding a cycle. It is possible that the competitive road cyclists in this study are people who  
2 have really good reflexes and road-awareness. This may be another reason why they are  
3 successful at cycling and why they feel optimistic about their abilities and their safety both  
4 while riding and while driving. Moreover, competitive road cyclists have reported more  
5 prudent behaviors while driving a car than did the non-cyclist groups, which supported  
6 Hypothesis 4. Prior regular experience in road environment as cyclists may make  
7 competitive road cyclists highly conscious of the potential dangers inherent to car drivers'  
8 behaviors. This idea would be supported by the recent study of Moller and Hels (2008)  
9 who showed that cars are generally seen by cyclists as the most important threat to  
10 cyclists' safety, an observation previously made by several studies (Noland & Kunreuther,  
11 1995; Wardman, Hatfield, & Page, 1997). Such a risk perception would influence in turn  
12 the feeling that one must drive carefully, a behavior reported by competitive road cyclists  
13 in our study.

14 We must acknowledge some limitations of the present study. First, we have used  
15 competitive cycling experience as the proxy measure for addressing the question of how  
16 other types of road use affect car use and risk perception while driving a car, without  
17 taking into account the extent to which the cyclists also cycle on the roads to go about  
18 their business. Second, we have not examined the role of other types of cycling experience  
19 such as cycling in town centers (to go shopping or to go at work location). Since the use of  
20 this transportation mode has grown considerably in town centers of French cities such as  
21 Paris, for practical, economical, and environmental reasons, further studies should take  
22 into account the role of cycling experience in French town centers. Third, we have focused  
23 on competitive road cyclists who were already active. Perhaps, having included people  
24 who tried cycling and were no longer active because they had poor perceived (or real)

1 cycling abilities, or because they had been seriously injured while cycling, might have  
2 revealed higher levels of perceived vulnerability and risky driving among the cyclists  
3 group. Further research should examine such hypotheses using a longitudinal design.  
4 Finally, as we have not controlled factors which can have an impact on risk perceptions  
5 and behaviors among car drivers (e.g., the number of driven kilometers per year), our  
6 results are exploratory rather than conclusive and suggest the need for further researches.

## 7 5. Conclusion

8 Our study provided support for a link between competitive cycling experience and  
9 what could be a general tendency to adopt prudent behaviors on the road. It also revealed  
10 that competitive road cyclists had a tendency to express CO regarding their QRD and their  
11 VAD. This suggested that CO was not systematically associated with detrimental behavior  
12 and thus may reflect relative accuracy in risk perception, supporting previous observations  
13 made in several domains of daily life activities (Gerrard, Gibbons, Benthin, & Hessling,  
14 1996; Milam, Sussman, Ritt-Olson, & Dent, 2001; Todesco & Hillman, 1999; see Van der  
15 Pligt, 1998, for a review), as well as in the field of road traffic (Causse et al., 2004; Harris  
16 & Middleton, 1994; Rutter et al., 1998). The results and the information gained from this  
17 study could prove to be useful to evaluate the role of cycling experience on risk perception  
18 and the prudent behaviors while driving a car. It may be relevant to encourage cycling  
19 from a prevention perspective, as well as from an environmental protection perspective,  
20 which is one of the main actual objectives of governments in developed countries.

21

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