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

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Abstract

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

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

Running head: risk comparative judgments among cyclists

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

1. Introduction

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

Some studies have demonstrated that CO was not systematic (Armor & Taylor, 1998; Causse, Delhomme, & Kouabenan, 2005; Meyer & Delhomme, 2000), as people 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, Verlhac, & Meyer, 2007; Perloff & Fetzner, 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,

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

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

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

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

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

2. Method

2.1. Participants

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

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

2.2. Procedure

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

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

2.3. Material

The questionnaire was divided in five sections. The first addressed background details of the respondents including age and sporting activity(ies). Participants were asked to report their frequency of practice, their competitive participation, and the number of 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'

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

2.4. Statistical analyses

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

3. Results

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

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

Insert Table 1

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

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

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

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

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

4. Discussion

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

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

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

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

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

5. Conclusion

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

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