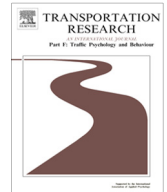




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Transportation Research Part F

journal homepage: www.elsevier.com/locate/trf

Peer pressure and risk taking in young drivers' speeding behavior

Alexandra Gheorghiu ^{a,*}, Patricia Delhomme ^b, Marie Line Felonneau ^c^a University of Alexandru Ioan Cuza, Faculty of Psychology and Education Sciences, Traffic Psychology Laboratory, Bd. Carol, no. 11, Iasi 700506, Romania^b French Institute of Science and Technology for Transport, Development and Networks, IFSTTAR, AME, LPC, F-78000 Versailles, France^c University of Bordeaux, France

ARTICLE INFO

Article history:

Received 14 September 2014

Received in revised form 20 August 2015

Accepted 7 October 2015

Available online 24 October 2015

Keywords:

Speeding
 Young drivers
 Peer pressure
 Peer risk taking
 Peer influence

ABSTRACT

Although many countermeasures have been implemented in Europe, young drivers continue to have a high rate of involvement in car crashes. Their crash rate is higher in presence of peer passengers than when driving alone. Peer presence could contribute toward explaining this involvement, especially regarding speeding. Peers are known to often influence young drivers' risky behaviors through proximal (direct and indirect active pressures) and distal (passive pressure) forms of intervention (Allen & Brown, 2008). This present study examined the effect of peer pressure and peer risk taking on the estimated speeding behavior of a scenario driver (ESBSD) as well as on the estimated speeding intention of a scenario driver (ESISD). The scenario driver was the main character in an online-scenario based questionnaire regarding speeding. The main character is a fictional young male depicted driving with his best friends in all the experimental scenarios in which the variables type of pressure and peer risk taking were manipulated. One hundred and eighty young French drivers (18–25 years, 50% men) took part in the study. The key findings were that (1) only direct and indirect active pressure, but not passive pressure, increased the ESBSD and that (2) high (vs. low) peer risk taking lead to a higher ESISD. However, no interaction between the pressure type and peer risk taking on ESBSD and ESISD was found. Implications of the findings are discussed.

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1. Introduction

Teenagers and young adults are known for their high involvement in risky behaviors compared to other age groups (Arnett, 1996). Novice and beginner drivers are over represented in car crashes (National Highway Traffic Safety Administration, 2008) in spite of the great progress achieved in understanding their behavior and of the countermeasures (Rivis, Abraham, & Snook, 2011; Scott-Parker, Watson, & King, 2009). According to the Organization for Economic Development (2006), novice and beginner drivers still represent almost a quarter of all drivers' deaths and have three to four times more crashes than any other older or more experienced group of drivers (Clarke, Ward, & Truman, 2005). For example, in 2013 in France, young drivers, who represent only 9% of the population, accounted for almost 19.5% of all road fatalities (ONISR, 2014).

* Corresponding author.

E-mail address: gheorghiu.anda@yahoo.com (A. Gheorghiu).

Among the leading causes of young drivers' car crashes are driving under the influence of alcohol and/or drugs (Bingham, Shope, & Zhu, 2008; Brookhuis, De Waard, Steyvers, & Bijsterveld, 2011), speeding (Cestac, Paran, & Delhomme, 2011; Delhomme, 2002; Lam, 2003) and fatigue (Ferguson, 2003). How can these risky behaviors be explained? Lack of experience (McKnight & McKnight, 2003; Williams, 2003), high levels of sensation seeking (Bachoo, Bhagwanjee, & Govender, 2013; Delhomme, Chaurand, & Paran, 2012; Mirman, Albert, Jacobsohn, & Winston, 2012; Scott-Parker, Watson, King, & Hyde, 2013), comparative optimism (DeJoy, 1989; Delhomme, Verhiac, & Martha, 2009), feelings of invulnerability (Chan, Wu, & Hung, 2010) and invincibility (Killgore, Kelley, & Balkin, 2010) and normative influence from peers (Allen & Brown, 2008; Cestac, Paran, & Delhomme, 2014; Preusser, Ferguson, & Williams, 1998) are usually considered as explanatory factors.

Fast driving is comprised of two levels: going faster than the speed limit and going too fast for conditions. Whereas both behaviors are dangerous (Braitman, Kirley, McCartt, & Chaudhary, 2008; Letirand & Delhomme, 2005), in this study we will focus only on going faster than the speed limit, thus on speeding. Speeding, the most frequent traffic violation (Delhomme, 2002; Delhomme & Cauzard, 2000; Hassan & Abdel-Aty, 2012; Ozkan, Lajunen, Chliaoutakis, Parker, & Summala, 2006; Peden et al., 2004), increases the probability of having a car crash and its severity, (Delhomme, 2008) in part because it reduces the control of the vehicle and raises the reaction time to obstacles (Garvill, Marell, & Westin, 2003). For young drivers speeding is particularly dangerous because they are not as proficient as older and more experienced drivers when it comes to hazard detection and response. In particular, they lack the experience and possibility to control the vehicle and to integrate the speed (Committee on Injury, Poison Prevention, & Committee on Adolescence, 2006). Many factors, such as sensation seeking (Dahlen & White, 2006), the desire to test one's driving skills (Rolls & Ingham, 1992) or simply to have fun (Wallén Warner & Åberg, 2008), as well as peer presence (Preusser et al., 1998) can influence a young driver's decision to speed.

The presence of passengers, and especially of peers, has been shown to affect young drivers' behavior. Some authors have found the presence of peer passengers to be a factor preventing risky driving. Young drivers accompanied by peers are more likely to comply more frequently with traffic regulations, like speed limitations (Black, 1978), time headways (Evansm, Wasielewski, & von Buseck, 1982), "stop" signs (McKelvie & Schamer, 1988) and, as a result have a lower risk of car crashes (Engstrom, Gregersen, Granstrom, & Nyberg, 2008; Rueda-Domingo et al., 2004; Vollrath, Meilinger, & Krüger, 2002). However, other studies have found that peer presence increases the crash risk and the severity of resulting injuries (Lambert-Bélanger, Dubois, Weaver, Mullen, & Bédard, 2012; Lee & Abdel-Aty, 2008; Preusser et al., 1998; Vollrath et al., 2002). Moreover, studies have shown that drivers are more likely to engage in risky behaviors, such as paying less attention to the driving activity (Vollrath et al., 2002), drinking and driving (Lee & Abdel-Aty, 2008), and to speed and follow closely (Delhomme, 1994; Simons-Morton, Lerner, & Singer, 2005). The conclusions regarding the effect of peer presence are contradictory. In order to increase our understanding regarding its negative influence on young drivers' behavior, we will review three different ways in which peer presence can disrupt their driving activity.

First, peer presence can often lead to distracting the driver by increasing the cognitive workload, as the driver has to divide his/her attention between the driving tasks and interacting with the passenger(s) (Curry, Mirman, Kallan, Winston, & Durbin, 2012; Heck & Carlos, 2008; Pradhan et al., 2014). Therefore the young driver is more prone to commit slip types of errors (Reason, Manstead, Stradling, Baxter, & Campbell, 1990) while driving. For example, he/she might unknowingly disregard a traffic rule, such as speeding or miss a traffic sign, like a "stop" sign.

Secondly, the mere presence of peers could lead to traffic violations, as the driver could be more willing to engage in different risky behaviors just to prove to their peer(s) that he/she can (Allen & Brown, 2008; Gardner & Steinberg, 2005). The social identity approach might provide a possible explanation for this phenomenon (Tajfel, 1982; Turner, Michael, Oakes, Reicher, & Wetherell, 1987). When a particular social identity represents the basis for self-conception, individuals are more prone to peer influence, since the behaviors accepted and/or expected by the group are more salient (Smith & Louis, 2008). Hogg, Turner, and Davidson (1990) found that, if the level of risk taking of the group as a whole is high, it will also be high for each member who identifies with that group. Young drivers have been known to engage in risky behaviors if their peers usually drive in a risky manner (Conner, Smith, & McMillan, 2003). Moreover, the peer risk taking level, and not peer presence, was significantly linked to crashes and near crashes (Simons-Morton et al., 2011). Furthermore, social norms (descriptive and injunctive) were found to be the best predictors of speed (Møller & Haustein, 2014). Finally, research has shown that drivers who identify highly with a group, report higher levels of speed than drivers who do not identify highly with the group (Horvath, Lewis, & Watson, 2012; Terry, Hogg, & White, 2000).

Finally, peer passengers can actually pressure young drivers into disregarding a traffic rule and persuade him/her to perform a risky behavior that he/she would have not performed otherwise (Curry et al., 2012; Shepherd, Lane, Tapscott, & Gentile, 2011). However, studies have shown that even if behavioral modification is achieved under these circumstances, it is usually temporary and will not change future behaviors (Delhomme & Meyer, 1998). According to Allen and Brown (2008) peers can influence young drivers' behavior by using two types of influence. Proximal influences imply that peer passengers actively interfere with the driving task, either verbally or physically. Distal influences occur mostly outside the driving context and usually involve norm negotiation in which acceptable patterns and driving behaviors are discussed and debated by group members. Therefore, distal influence supposes norm negotiation, whereas peer risk taking is based on a more subtle form of influence, relying mostly on the salience of risk taking norm but not on its negotiation. Furthermore, while distal influence is specific to driving behavior, peer risk taking influence is not. As Simons-Morton et al. (2011) found, peer risk taking in general increased the probability of young driver risk taking behavior.

From this point forward, we will refer to proximal influences as active pressure, because passengers actively interfere and highlight the in-group norms and to distal influences as passive pressure, since the mere presence of passengers can activate and/or enforce the in-group norms.

Active types of pressure can be further divided into direct and indirect pressure. Direct active pressure assumes that peers overtly encourage the driver to break a traffic rule while driving. Indirect active pressure (storytelling) assumes that one of the peers is narrating an incident involving a dangerous driving episode emphasizing the fun and excitement, a fact that triggers the approval of the other peers. Indirect active pressure should activate the social identification processes (Tajfel, 1982) and therefore increase the likelihood that the driver will behave according to the norm which is made salient. Both direct and indirect active pressure represents explicit forms of influence, where the demand is verbally formulated in order to achieve certain behavioral modifications. Finally, passive pressure is based on the assumption that perceived norms from a group the driver identifies himself/herself with can highly influence his/her behavior (Cestac et al., 2014).

The peer pressure type has been previously investigated in relation to speeding by Horvath et al. (2012) and Sela-Shayovitz (2008). Horvath et al. (2012) found no effect of the type of pressure on drivers' speeding intentions while Sela-Shayovitz (2008) observed that passive pressure type, rather than active pressure has a significant effect on speeding intentions. Although Horvath et al. (2012) and Sela-Shayovitz (2008) provided relevant findings, there is still little known about the circumstances that enable peers to change a young driver's behavior. Therefore, this current study addresses the issues of whether and in which conditions peer passengers can change young driver's estimated behavior. This study focuses on the role that peer pressure and peer risk taking could have in certain conditions on perceived speeding behavior and intention to speed. Estimated speeding intention and intention to speed were analyzed in this study because we needed to take into account both the spontaneous and the deliberated aspects of speeding. Young people's risky behavior can be a reaction to social risk-conducive circumstance thus being an unintentional behavior as studied in the prototype willingness model (Gibbons, Gerrard, Blanton, & Russell, 1998). Risk taking behaviors can also be determined by behavioral intention (planning to produce or not to produce the behavior) thus being a deliberate behavior as predicted and explained in the Theory of Planned Behavior (TPB, Ajzen, 1991).

Several scenarios enabled us to manipulate the type of peer pressure type (direct active, indirect active, and passive pressure) and levels of peer risk taking (high vs. low) in order to analyze their influence on the perceived speeding behavior and perceived intention to speed of a fictional young male driver (the scenario driver). Scenarios with fictional main characters are frequently used to investigate different types of behaviors, such as eating disorder perception (Wingfield, Kelly, Serdar, Shivy, & Mazzeo, 2011), bullying (Carney, 2000), workplace harassment (Claybourn, Spinner, & Malcom, 2014) or driver's perception of culpability (Williams, Davies, Thiele, Davidson, & MacLean, 2012).

We expected that peer pressure type would influence the estimated speeding behavior of the scenario driver (ESBSD) and the estimated intention to speed of the scenario driver (ESISD). More specifically, consistent with Sela-Shayovitz (2008), we anticipated a main effect of peer pressure type such that passive peer pressure would lead to a greater ESBSD and ESISD than active pressure (both direct and indirect) (Hypothesis 1). We also expected a main effect of peers' risk taking level on ESBSD and ESISD, such that high risk taking peers would result in higher estimated ESBSD and ESISD (Simons-Morton et al., 2011) (Hypothesis 2). Also, it was anticipated that, consistent with the findings of Sela-Shayovitz (2008) and Simons-Morton et al. (2011) passive peer pressure with high risk taking peers would result in the highest ESBSD and ESISD and that active peer pressure (both direct and indirect) with low risk taking peers would result in the lowest (Hypothesis 3).

2. Method

2.1. Participants

The participants were 180 young French drivers (50% men). The mean age was 22.10 (SD = 1.80; min 18–max 25 years), they have had their driving license for 2.67 years (SD = 1.78, min > 1 year–max 7 years) and drove almost 30,156 km (SD = 62,692, min 35 km–max 700,000 km) from the time they had their driving license. Most of them have driven less than 10,000 km in the past year (69.4%). Among them, 20% had had one car crash in the past three years, and 17.2% had lost points on their driving license, mainly due to speeding (25 of 30 cases). Participants said that they have lost from 1 to 8 points ($M = 2.48$, $SD = 1.83$).

2.2. Materials and procedure

Six online scenario-based questionnaires involving a fictional young male driver pressured to speed by his passengers, were used. A fictional young male driver was selected as the main character in the scenario because men are known to have a higher involvement in car crashes (Rolls & Ingham, 1992) and to be more prone to speeding (Stradling et al., 2003). By using a fictional character, we consider that the situation was more comfortable for the participants as it does not rely on their personal experience (many of the participants might not have experienced themselves a situation similar to that described in the scenario) and it avoids, to a certain degree, socially desirable answers.

Scenario example: Direct Active Pressure, High Risk Taking Peers

“Mark is driving in his usual car. It is Sunday, 2:00 o’clock in the afternoon; the weather is sunny and clear. He is driving with his best friends from high school, with whom he usually drives. All his passengers have their driver’s license, and they frequently drive without complying with the speed limitations. Mark is actually driving at 90 km/h, the limit speed for that section of road. There are no cars ahead.

One of his friends notices that he is complying with the speed limitations and asks him to speed up by making fun of his driving style. Immediately all the other passengers in the car start making fun of Mark by saying, “You are driving too slowly! “

In each scenario the driver was accompanied by his best friends, all drivers. We induced in this way group identification. Peers’ gender was not mentioned in the scenario because, as [Shepherd et al. \(2011\)](#) showed, it had no impact on the effect of peer influence on driver’s behavior.

In half of the scenarios the request to speed was formulated by a high risk taking (HI-R) group of peers and in the other half, the request came from a low risk taking (LO-R) group. Peer risk taking was manipulated by providing information on peers’ speeding behavior (they respect vs. break the speed limits). The pressure type was manipulated by having passengers verbally encourage speeding (direct active pressure), through storytelling (indirect active pressure) or remaining silent, but be considered to approve speeding (passive pressure).

This manipulation resulted in six conditions: condition (1) and (4) HI-R/LO-R direct active pressure which represented a situation where high or low risk taking peers verbally encouraged the driver to speed, condition (2) and (5) HI-R/LO-R indirect active pressure presented the situation where high or low risk taking peers were telling a story about another driver who was speeding and, in this way, entertaining his passengers, condition (3) and (6) HI-R/LO-R passive pressure where the high or low risk taking peers silently approved the speeding behavior. Each participant was randomly assigned to one of the six conditions. There were 30 participants (50% men) in each condition. Participants were able to see only one of the six scenarios and were instructed to answer the questions according to the scenario they had read. During the quasi-experiment, participants were able to read the scenario as many times as they wanted.

The scenario-based questionnaire was disseminated on social networks (i.e. French student groups on Facebook) and different French forums such as Information Relay on Cognitive Sciences.¹ Where needed, a message was sent to the forum or group administrator asking for permission to post the recruiting message online. Following the publication of the message a link was displayed inviting the participants to take part in the research.

2.3. Measures

Except for the scale assessing the estimated speeding behavior, all scales used a 5-point Likert scale. For the multiple items’ scale, a single average score was computed.

- Estimated speeding behavior: participants were asked to indicate the speed in km/h that the driver in the scenario was most likely to choose in that situation. This item was open ended, participants being free to choose any speed value. *e.g.: In your opinion, at what speed will Mark, the driver in the scenario, choose to drive in this situation?*
- Estimated speeding intention: participants evaluated if the driver had had the intention to break the speed limit in the situation presented (item 1) and in other similar situations (item 2). Furthermore, they were asked to estimate if they consider that the driver will continue to drive at 90 km/h (item 3), and if he had the intention to drive 10 km/h (item 4) and 20 km/h over the speed limit (item 5) ($\alpha = .80$). *e.g. Will Mark, the driver in the scenario, have the intention to exceed the speed limit (90 km/h)?*

To evaluate the effectiveness of the experimental manipulations, participants were asked to assess whether the peers tried to pressure the driver (perceived peer pressure), whether the peers were high or low risk takers (perceived peer risk taking) and if the passengers and peers formed a group (perceived group identification).

- Perceived peer pressure: participants assessed whether the passengers had tried to influence the driver’s speed (item 1); if they had tried to change the driver’s behavior so that he would drive faster (item 2); if they consider that the driver’s speeding behavior was influenced by his passengers (item 3); and if they considered that driver had changed his speed following peer intervention (item 4) ($\alpha = .81$). Their answers ranged from (1) not at all to (5) completely. *e.g.: In your opinion, did Mark’s passengers try to change his driving behavior?*
- Perceived peer risk taking: participants evaluated the peer passengers’ level of risk taking in general (item 1); regarding speed limits (they respect vs. disrespect speed limits) (item 2); and traffic rules in general (item 3) ($\alpha = .79$). Their answers ranged from (1) not at all to (5) completely. *e.g.: In your opinion, do Mark’s passengers take risks when driving?*

¹ Relais d’Information sur les Sciences de la Cognition in French

- Perceived group identification: participants were asked to assess whether the passengers and the driver belonged to the same group (item 1); whether they were good friends (item 2); if they consider that they spend a lot of time together (item 3); and if they shared the same values, interests and attitudes (item 4) ($\alpha = .71$). Their answers ranged from (1) not at all to (5) completely. e.g.: *In your opinion, are Mark and his passengers close friends?*

3. Results

3.1. Manipulation check

For direct active pressure the mean for perceived peer pressure was 4.01 (SD = .82), for indirect active pressure it was 3.74 (SD = .95) and for passive pressure it was 3.57 (SD = .90). The maximum possible for all scales was 5, thus the results indicate that participants perceived that the driver was pressured by the peer passengers. The difference between the three types of pressure was significant ($F_{(2,177)} = 3.69, p = .02, \eta^2 = .04$).

As seen in Table 1, participants in the high risk taking group perceived that peers took more risks when driving and that they disrespected speed limits more frequently than those in the low risk taking group. The first item (see Table 1) was eliminated from the subsequent analysis as no difference between high and low risk taking groups was found.

Table 2 presents the results obtained for perceived group identification in each of the six conditions. The overall mean was 3.95 (SD = .55) of a maximum of 5 possible, indicating that the driver and his passengers were perceived as belonging to the same group.

3.2. Descriptive statistics

In Table 3a means and standards deviations for estimated speeding behavior, estimated speeding intention, estimated peer pressure and peer risk taking in the conditions high peer risk taking were reported. Overall the participants estimated that the driver would exceed the legal speed limit presented in the scenario, and that he would have the intention to speed.

Similarly, in Table 3b, means and standard deviations for the same variables in the condition low peer risk taking were presented. Participants estimated that the driver would exceed the speed limit, and that he would have the intention to speed.

Table 1
Mean and standard deviation for peer risk taking manipulation check.

	High risk taking		Low risk taking		<i>t</i> -test	<i>d</i> Cohen
	M	SD	M	SD		
Do you consider that Mark's friends generally take risks?	3.70	.88	3.50	.93	1.47 n.s.	.22
Do you consider that Mark's friends disrespect the speed limits?	4.03	.75	3.77	.88	2.17*	.31
Do you consider that Mark's friends take risks when driving?	3.78	.77	3.48	.92	2.35*	.35

* $p < .05$.

Table 2
Means and standard deviation for perceived group identification manipulation check.

	High risk			Low risk		
	Direct active pressure	Indirect active pressure	Passive pressure	Direct active pressure	Indirect active pressure	Passive pressure
M	3.99	3.95	3.93	3.90	3.91	4.08
SD	.48	.55	.58	.51	.60	.52

Table 3a
High risk taking peer group means for ESBSD^a, ESISD^b, Perceived peer pressure, and Perceived risk taking passengers by Gender and Pressure Type.

	HI-R ^c direct active pressure				HI-R indirect active pressure				HI-R passive pressure			
	Men		Women		Men		Women		Men		Women	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
ESBSD ^a	102.19	8.15	105.00	8.33	104.80	11.82	101.33	6.67	99.40	7.55	99.33	5.26
ESISD ^b	3.48	.52	3.54	.75	3.55	.84	3.57	.82	3.48	.55	3.53	.52
Perceived peer pressure	4.20	.62	3.82	.77	3.83	.91	4.13	.73	3.70	.72	3.61	.85
Perceived peers risk taking	3.91	.49	3.97	.59	3.64	.84	3.82	.76	3.84	.56	3.82	.64

^a Estimated speeding behavior of the scenario driver.

^b Estimated speeding intention of the scenario driver.

^c High risk taking.

Table 3b

Low risk taking peer group means for ESBSD^a, ESISD^b, perceived peer pressure and perceived risk taking passengers as a function of gender and pressure type.

	LO-R ^c direct active pressure				LO-R indirect active pressure				LO-R passive pressure			
	Men		Women		Men		Women		Men		Women	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
ESBSD ^a	102.33	12.73	99.38	7.50	96.33	26.33	110.16	16.52	96.87	6.85	98.13	7.20
ESISD ^b	3.92	.61	3.51	.87	3.21	.76	3.37	.70	3.26	.73	3.14	.66
Perceived peer pressure	4.00	.84	3.95	1.04	3.43	1.21	3.58	.82	3.30	.85	3.68	1.16
Perceived peers risk taking	3.59	1.04	3.64	.83	3.40	.87	3.28	.45	3.82	.67	3.73	.77

^a Estimated speeding behavior of the scenario driver.

^b Estimated speeding intention of the scenario driver.

^c Low risk taking.

Participants indicated that they consider that the driver would exceed the speed limit of 90 km/h by a minimum of 6.33 km/h and a maximum of 20 km/h. There were no significant differences between men and women in the estimation of speed ($t(178) = -.07, p = .93$).

Table 4 presents correlations between estimated speeding behavior of the scenario driver (ESBSD), estimated intention to speed of the scenario driver (ESISD), perceived peer risk taking, perceived peer pressure and perceived group identification. ESBSD correlated with estimated ESISD and perceived peer pressure but not with perceived peer risk taking or group identification. ESISD on the other hand correlated with perceived peer pressure and perceived group identification but not with perceived peer risk taking.

3.3. The effects of peer pressure type and peer risk taking on ESBSD and ESISD

A 2×3 factorial ANOVA was conducted using peer pressure type (direct active, indirect active, vs. passive pressure) and peer risk taking (high vs. low) as independent variables and ESBSD and ESISD as dependent variables. Eta² was computed for each effect.

The results showed only a main effect of the peer pressure type [$F(2, 174) = 6.42, MSE = 105.5, p = .002, \eta^2 = .07$]. Post hoc comparisons using the Dunnett test indicated that the mean score for the direct active pressure condition ($M = 103.41, SD = 10.39$) significantly differed from the passive pressure condition ($M = 98.43, SD = 6.76$) and that indirect active pressure condition ($M = 104.53, SD = 12.67$) significantly differed from the passive pressure condition ($M = 98.43, SD = 6.76$). No difference was found between direct active pressure and indirect active pressure conditions. As seen in Fig. 1, participants who answered a scenario where an active form of pressure (direct or indirect) was used reported higher levels of ESBSD than those who were submitted to a passive form of pressure. The main effect of peer risk taking level [$F(1, 174) = 0.10, p = .72, \eta^2 = .00$] and the interaction between peer pressure type and peer risk taking level on ESBSD [$F(2, 174) = 1.06, p = .34, \eta^2 = .01$] were not significant.

Peer pressure type had a general effect on the ESBSD regardless of the condition. The ESBSD mean across all conditions ($M = 102.13, SD = 10.25$) was significantly different from the legal speed limit indicated in the scenario (90 km/h) ($t = 16.06, p < .000, d = 1.21$). These results were found even for passive pressure, which yielded the lowest estimated speeding behavior levels ($M = 98.43, SD = 6.76$). The ESBSD in the passive pressure conditions significantly differed from the legal speed limit indicated in the scenario ($t = 9.79, p < .000, d = 1.25$). However, active pressure types (direct and indirect) had a greater effect on ESBSD than the passive pressure type.

As seen in Fig. 2, there was a main effect of peer risk taking level on the ESISD [$F(1, 174) = 6.51, MSE = 0.65, p = .01, \eta^2 = .02$], such that those in the high peer risk taking level group ($M = 4.23, SD = .73$) reported higher ESISD than those in the low peer risk taking level group ($M = 3.98, SD = .87$). However, the main effect of the peer pressure type [$F(2, 174) = 0.47, p = .62, \eta^2 = .00$] and the interaction between pressure type and peer risk taking [$F(2, 174) = 0.48, p = .61, \eta^2 = .00$] were not significant on the ESISD.

Table 4

Correlations between ESBSD^a, ESISD^b, Perceived peer risk taking, perceived peer pressure, and perceived group identification.

	M	SD	ESBSD ^a	ESISD ^b	Perceived peer risk taking	Perceived peer pressure	Perceived group identification
ESBSD ^a	101.70	12.55	–				
ESISD ^b	4.11	.79	.49**	–			
Perceived peer risk taking	2.50	.50	-.03	.07	–		
Perceived peer pressure	3.78	.90	.16**	.23**	.41**	–	
Perceived group identification	4.10	.60	-.10	.21**	-.15*	-.13	–

* $p = 0.05$.

** $p = 0.01$.

^a Estimated speeding behavior of the scenario driver.

^b Estimated speeding intention of the scenario driver.

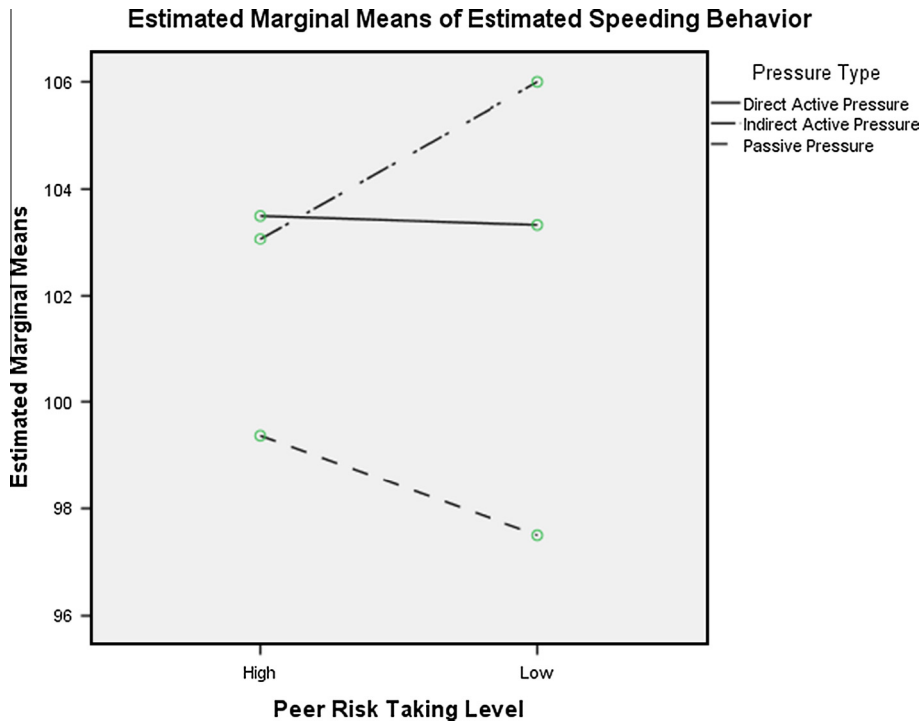


Fig. 1. Estimated speeding behavior of the scenario driver for 3 (pressure type) × 2 (peer risk taking) between subjects ANOVA.

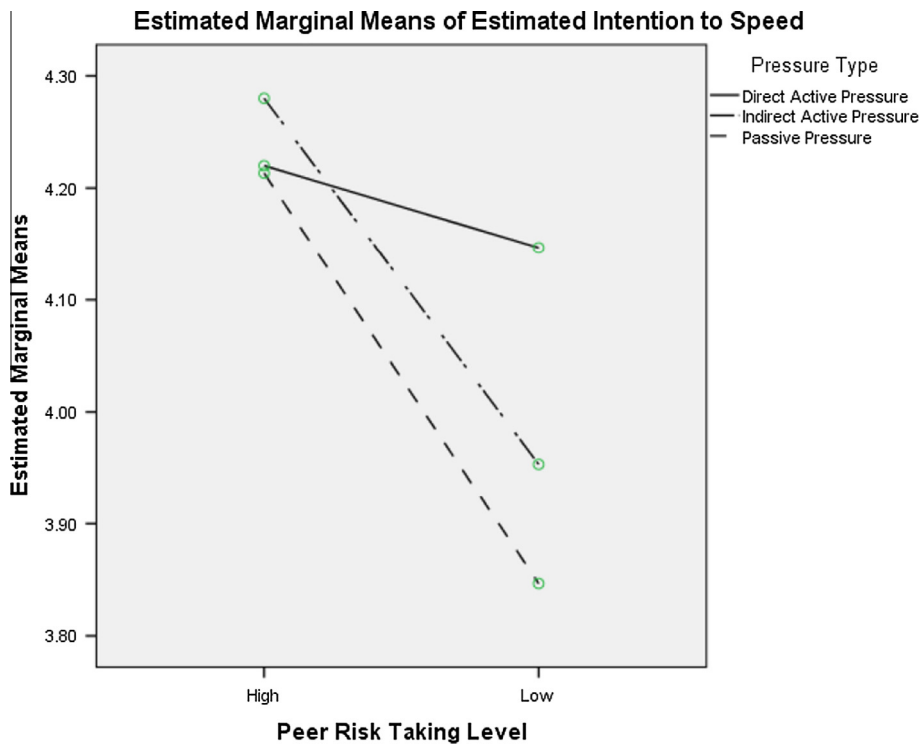


Fig. 2. Estimated intention to speed of the scenario driver for 3 (pressure type) × 2 (peer risk taking) between subjects ANOVA.

4. Discussion

The aim of this study was to analyze the effect of pressure type and peer risk taking on the estimated speeding behavior and estimated intention to speed of a fictional young male driver (the scenario driver). In order to attain our goal, six driving scenarios were developed. Through these scenarios we were able to analyze in which conditions peer presence can change a young driver's behavior, so that he/she engages in risky driving manoeuvres, such as speeding.

Our results showed that active type of pressure (both direct and indirect) influenced the ESBSD driver while passive pressure did not. The pressure type had an effect only on the ESBSD which is in line with the findings of [Shepherd et al. \(2011\)](#) (Hypothesis 1). These authors found that peer interventions, in the form of verbal and normative influence, increased the speed of the driver. However, we found not only that explicit (direct and indirect active pressure) and implicit (passive pressure) demands from peers have led to a change in the estimation of the driver's behavioral response, but also that there was no change in the estimated intention to speed of the scenario driver. Since intentions remained unchanged, these findings seem to suggest that speeding can be, in this context, a spontaneous behavior. Finally, it is important to highlight that active types of pressure yielded a higher level of estimated speeding behavior than passive types of pressure (Hypothesis 3). Previous findings reported either that passive pressure, rather than active pressure, had led to a greater intention to speed or found no effect of peer pressure type on the self-reported speed ([Horvath et al., 2012](#)). These findings may be explained by the use of a fictional main character. The participants might have felt more comfortable estimating the behavior of an unknown driver and admitting that he changes his behavior to accommodate his peers' demands than having to do the same for their own behavior.

These results can be interpreted by using at least three perspectives. First, these results are consistent with those of [Gibbons et al. \(1998\)](#) who already suggested that risk taking behaviors among young people are not always planned or intentional but often just a reaction to occasions that arise. Secondly, previous research suggested that this type of influence is usually situational, therefore its effects will not be long lasting ([Delhomme & Meyer, 1998](#)), nor will they influence more stable structures, such as intentions. Thirdly, the results can be interpreted in terms of compliance ([Asch, 1951](#)). Indeed, the conditions can stimulate the appearance of this phenomenon: there are several passengers whom, all of them, ask the scenario driver the same thing: to increase his speed. If we take into account the fact that intentions were not changed by peer pressure, that the driver changed his behavior for only a short period of time and returned to his initial speed, our results can, indeed, indicate an effect of compliance. Nevertheless, taking into account that young drivers have difficulties managing vehicles at high speed ([Committee on Injury, Poison Prevention, & Committee on Adolescence, 2006](#)), these short-term behavioral modifications must be further investigated, as the consequences of these brief behavioral changes regarding speeding can be severe.

Regarding the influence of peer risk taking on the ESBSD and ESISD we anticipated that high (vs. low) levels of peer risk taking will entail a higher estimated speed behavior and intention to speed (Hypothesis 2). There is no main effect of peer risk taking on ESBSD. This lack of effect could be explained by the fact that peer risk taking is not very salient in the situation presented, thus it could influence the behavior less. However, we found a main effect on the ESISD, such as higher peer risk taking led to a higher ESISD. Association with peers who have a high levels of risk taking appears to have a more profound and long lasting effect on young drivers' behavior since it acts on their intentions, thus on the deliberate aspect of speeding. Behavioral intentions are highly correlated with self-reported and actual behavior ([Armitage & Conner, 2001](#)). Young drivers, after obtaining their license, find themselves in the early stages of creating their own driving style, as well as their own driving norms. During this search of their own identity as a driver, they are sensitive to different sources of influence, especially from peers ([Fleiter, Watson, Lennon, & Lewis, 2006](#)). Their behavior is therefore easily modifiable through social learning ([Bandura, 1971](#)). As the young driver is more often exposed to risky driving behaviors of his/her peers, the more they will get accustomed and learn to perform them.

Another finding is in regards to gender differences. Women tend to have similar means to men for ESBSD, ESISD and to perceive the same level of risk taking and pressure from the part of the peers in the scenario. This finding contradicts the general knowledge that women tend to be more cautious when driving than men ([Félonneau, Aigrot, & Causse, 2009](#); [Laapotti, Keskinen, & Rajalin, 2003](#); [Meadows & Stradling, 2000](#)) and that men are more prone to speeding ([Harré, 2000](#); [Harré, Foster, & O'Neill, 2005](#); [Schmid, Sieverding, Esslen, Graber, & Jäncke, 2008](#)). However, recent work has shown that differences between men and women, when it comes to traffic behavior, are no longer so prominent ([McKenna, Waylen, & Burkes, 1998](#); [Wickens, Mann, Stoduto, Ialomiteanu, & Smart, 2011](#)), support our results. Another possible explanation for these results could be gender expectations. Men are considered more prone to speeding and risky driving ([Laapotti & Keskinen, 1998](#)), thus the female participants might have overestimated the perceived speed and intention to speed of the male scenario driver in order to agree with these expectations.

The effect of peer pressure seems to be rather negative as it increases the ESBSD and emphasizes the need to take measures in order to limit the frequency of young drivers' driving with friends. Even if the effect size for peer risk taking on ESISD is small ($\eta^2 = .02$), the effect size of peer pressure type on ESBSD is medium ($\eta^2 = .07$) suggesting that peers could affect young drivers' speed behavior, even if only for a brief moment. However, these results must be interpreted with caution, as our results indicate only a significant influence of peer pressure on the estimated speeding behavior of a fictional young male driver and not on self-reported or observed behaviors.

Our results have important practical implications for prevention and intervention among young drivers. The effect found on a driver's estimated speed behavior as a result of peer pressure might be taken into account, for example, in road safety campaigns and driver's education. Two possible measures may be considered. One approach could come from law enforcement by limiting the number of peer passengers a young driver can carry for those who have had their license less than three years (the driving experience in our sample) and/or for certain periods of time (for example in the evening, during the night). It may be assumed that by reducing the number of passengers the effect of peer pressure is being lowered. In the United States this measure has been already implemented, thus forbidding young drivers to carry more than two peer passengers (Williams, Preusser, Ferguson, & Ulmer, 1997). France might consider adding this measure to its actual law enforcement measures since it has obtained an important reduction in car crashes as a result of the implementation of Automatic Speed Reduction system (ONISR, 2006). A second approach may come from safety campaigns where young drivers can be taught various in-vehicle peer pressure resistance skills (Delhomme, Dedobbeleer, Forward, & Simoes, 2009).

Another practical implication of our findings regards the influence of peer risk taking levels on intention to speed. One possible intervention in this area could be to accentuate, through media and educational campaigns, the positive value of law obeying behaviors. Law-breaking and risky driving behaviors could be presented as outside acceptable peer norms. Furthermore, safety campaigns should also consider targeting passengers, and not only the drivers, by emphasizing their shared responsibility for safer travelling behaviors. Finally, it is important to inform students during their driver training lessons about the existence of these sources of influence. For instance, they can be made aware that peer driving behavior influences their own behavior and about verbal and behavioral peer incitement to engage in risky behaviors.

5. Limits and future directions

This study has a series of limits. One of the limitations concerns the choice of scenario. Using a scenario with a fictional main character might have enhanced an individual's tendency to report higher speed and intention to speed than if the participant himself/herself would have been the main character. Another potential limitation is given by the choice of a male driver that might have influenced the women participant's answers. Future research should consider using both male and female drivers in the scenario in order to better control for gender effects.

Future studies should aim for a more profound and accurate understanding of the effect of peer pressure on drivers' behavior by better distinguishing between active and passive pressure. It is important to find new and more efficient ways to manipulate these two types of pressure, as their effect on drivers' behavior seems to be important. Also, the effect of peer risk taking must be further examined by analyzing other different behaviors (such as drinking and driving, crossing at red lights) as well as by varying the types of risks peers engage in. Finally, researchers might also focus on the protective effect of peers, by testing whether the same influences appear when peers try to dissuade the driver from engaging in risky behaviors and whether their protective effect is greater than their negative influence.

Acknowledgments

This paper is a result of a research made possible by the financial support of the Sectorial Operational Programme for Human Resources Development 2007-2013, co-financed by the European Social Fund, under the project POSDRU/159/1.5/S/132400 – “Young successful researchers – professional development in an international and interdisciplinary environment”.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Allen, J. P., & Brown, B. B. (2008). Adolescents, peers, and motor vehicles: The perfect storm? *American Journal of Preventive Medicine*, 35(suppl. 3), S289–S293.
- Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471.
- Arnett, J. J. (1996). Sensation seeking, aggressiveness, and adolescent reckless behavior. *Personality and Individual Differences*, 20(6), 693–702. [http://dx.doi.org/10.1016/0191-8869\(96\)00027-X](http://dx.doi.org/10.1016/0191-8869(96)00027-X).
- Asch, S. E. (1951). Effects of group pressure upon the modification and distortion of judgments. In H. Guetzkow (Ed.), *Groups, leadership and men research in human relations* (pp. 177–190). Oxford, England: Carnegie Press.
- Bachoo, S., Bhagwanjee, A., & Govender, K. (2013). The influence of anger, impulsivity, sensation seeking and driver attitudes on risky driving behaviour among post-graduate university students in Durban, South Africa. *Accident Analysis and Prevention*, 55, 67–76. <http://dx.doi.org/10.1016/j.aap.2013.02.021>.
- Bandura, A. (1971). *Vicarious and self-reinforcement processes. The nature of reinforcement*. New York and London: Academic Press (pp. 228–278). New York and London: Academic Press.
- Bingham, C. R., Shope, J. T., & Zhu, J. (2008). Substance-involved driving: Predicting driving after using alcohol, marijuana, and other drugs. *Traffic Injury Prevention*, 9(6), 515–526. <http://dx.doi.org/10.1080/15389580802273698>.
- Black, C. L. (1978). Drivers' compliance with formal traffic regulations related to the presence of passengers. Kingston, Ontario: Queens University, unpublished BA.
- Braitman, K. A., Kirley, B. B., McCartt, A. T., & Chaudhary, N. K. (2008). Crashes of novice teenage drivers: Characteristics and contributing factors. *Journal of Safety Research*, 39(1), 47–54.
- Brookhuis, K. A., De Waard, D., Steyvers, F. J. J. M., & Bijsterveld, H. (2011). Let them experience a ride under the influence of alcohol; A successful intervention program?. *Accident Analysis and Prevention*, 43(3), 906–910.
- Carney, J. V. (2000). Bullied to death: Perceptions of peer abuse and suicidal behaviour during adolescence. *School Psychology International*, 21(2), 213–223. <http://dx.doi.org/10.1177/0143034300212007>.

- Cestac, J., Paran, F., & Delhomme, P. (2011). Young drivers' sensation seeking, subjective norms, and perceived behavioral control and their roles in predicting speeding intention: How risk-taking motivations evolve with gender and driving experience. *Safety Science*, 49(3), 424–432.
- Cestac, J., Paran, F., & Delhomme, P. (2014). Drive as I say, not as I drive: Influence of injunctive and descriptive norms on speeding intentions among young drivers. *Transportation Research Part F: Traffic Psychology and Behaviour*, 23, 44–56.
- Chan, D. C. N., Wu, A. M. S., & Hung, E. P. W. (2010). Invulnerability and the intention to drink and drive: An application of the theory of planned behavior. *Accident Analysis and Prevention*, 42(6), 1549–1555. <http://dx.doi.org/10.1016/j.aap.2010.03.011>.
- Clarke, D. D., Ward, P., & Truman, W. (2005). Voluntary risk taking and skill deficits in young driver accidents in the UK. *Accident Analysis and Prevention*, 37(3), 523–529.
- Claybourn, M., Spinner, B., & Malcom, K. (2014). Workplace harassment: A test of definitional criteria derived from an analysis of research definitions and Canadian social definitions. *International Journal of Law and Psychiatry*, 37(6), 589–600. <http://dx.doi.org/10.1016/j.ijlp.2014.02.033>.
- Committee on Injury, Poison Prevention, & Committee on Adolescence (2006). The teen driver. *Pediatrics*, 118(6), 2570–2581. <http://dx.doi.org/10.1542/peds.2006-2830>.
- Conner, M., Smith, N., & McMillan, B. (2003). Examining normative pressure in the theory of planned behaviour: Impact of gender and passengers on intentions to break the speed limit. *Current Psychology*, 22(3), 252–263. <http://dx.doi.org/10.1007/s12144-003-1020-8>.
- Curry, A. E., Mirman, J. H., Kallan, M. J., Winston, F. K., & Durbin, D. R. (2012). Peer passengers: How do they affect teen crashes? *Journal of Adolescent Health*, 50(6), 588–594.
- Dahlen, E. R., & White, R. P. (2006). The Big Five factors, sensation seeking, and driving anger in the prediction of unsafe driving. *Personality and Individual Differences*, 41(5), 903–915.
- DeJoy, D. M. (1989). The optimism bias and traffic accident risk perception. *Accident Analysis and Prevention*, 21(4), 333–340. [http://dx.doi.org/10.1016/0001-4575\(89\)90024-9](http://dx.doi.org/10.1016/0001-4575(89)90024-9).
- Delhomme, P. (1994). La presence de passager(s) favorise-t-elle le port de la ceinture de securite en ville. *Bulletin de Psychologie, Tome, XLVIII*(418), 38–49.
- Delhomme, P. (2002). Croyances des jeunes automobilistes en matière de vitesse. (Vol. Convention DSCR-INRETS N°00/010/T-étude No. 7).
- Delhomme, P. (2008). Éditorial. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology*, 58(1), 1–4. <http://dx.doi.org/10.1016/j.erap.2006.12.001>.
- Delhomme, P., & Cauzard, J.-P. (2000). Comparer sa vitesse à celle d'autrui comparaison sociale et représentation de la conduite chez les automobilistes européens. *Recherche-Transports-Sécurité*, 67, 39–60. [http://dx.doi.org/10.1016/S0761-8980\(00\)90106-7](http://dx.doi.org/10.1016/S0761-8980(00)90106-7).
- Delhomme, P., Chaurand, N., & Paran, F. (2012). Personality predictors of speeding in young drivers: Anger vs. sensation seeking. *Transportation Research Part F: Traffic Psychology and Behaviour*, 15(6), 654–666. <http://dx.doi.org/10.1016/j.trf.2012.06.006>.
- Delhomme, P., Dedobbeleer, W., Forward, S., & Simoes, A. (2009). Manual for designing, implementing, and evaluating road safety communication campaigns. Campaigns and Awareness Raising Strategies in Traffic Safety (CAST project) 6e PCRD: EC.
- Delhomme, P., & Meyer, T. (1998). Control motivation and young drivers' decision making. *Ergonomics*, 41(3), 373–393. <http://dx.doi.org/10.1080/001401398187099>.
- Delhomme, P., Verhliac, J.-F. O., & Martha, C. C. (2009). Are drivers' comparative risk judgments about speeding realistic? *Journal of Safety Research*, 40(5), 333–339.
- Engstrom, I., Gregersen, N. P., Granstrom, K., & Nyberg, A. (2008). Young drivers-reduced crash risk with passengers in the vehicle. *Accident Analysis and Prevention*, 40(1), 341–348.
- Evansm, L., Wasielewski, P., & von Buseck, C. R. (1982). Compulsory seat belt usage and driver risk-taking behavior. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 24(1), 41–48. <http://dx.doi.org/10.1177/001872088202400105>.
- Félonneau, M.-L., Aigrot, F., & Causse, E. (2009). Factors that dissuade young drivers from committing traffic violations. *Psychological Reports*, 104(2), 489–499. <http://dx.doi.org/10.2466/pr0.104.2.489-499>.
- Ferguson, S. A. (2003). Other high-risk factors for young drivers—how graduated licensing does, doesn't, or could address them. *Journal of Safety Research*, 34(1), 71–77. [http://dx.doi.org/10.1016/S0022-4375\(02\)00082-8](http://dx.doi.org/10.1016/S0022-4375(02)00082-8).
- Fleiter, J. J., Watson, B. C., Lennon, A. J., & Lewis, I. M. (2006). Significant others, who are they? – Examining normative influences on speeding. In *Paper presented at the Australasian road safety research policing education conference, Gold Coast*.
- Gardner, M., & Steinberg, L. (2005). Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: An experimental study. *Developmental Psychology*, 41(4), 625–635. <http://dx.doi.org/10.1037/0012-1649.41.4.625>.
- Garvill, J., Marell, A., & Westin, K. (2003). Factors influencing drivers' decision to install an electronic speed checker in the car. *Transportation Research Part F: Traffic Psychology and Behaviour*, 6(1), 37–43. [http://dx.doi.org/10.1016/S1369-8478\(02\)00045-1](http://dx.doi.org/10.1016/S1369-8478(02)00045-1).
- Gibbons, F. X., Gerrard, M., Blanton, H., & Russell, D. W. (1998). Reasoned action and social reaction: Willingness and intention as independent predictors of health risk. *Journal of Personality and Social Psychology*, 74(5), 1164–1180.
- Harré, N. (2000). Risk evaluation, driving, and adolescents: a typology. *Developmental Review*, 20(2), 206–226.
- Harré, N., Foster, S., & O'Neill, M. (2005). Self-enhancement, crash-risk optimism and the impact of safety advertisements on young drivers. *British Journal of Psychology*, 96(2), 215–230. <http://dx.doi.org/10.1348/000712605x36019>.
- Hassan, H. M., & Abdel-Aty, M. A. (2012). Exploring the safety implications of young drivers' behavior, attitudes and perceptions. *Accident Analysis and Prevention*. <http://dx.doi.org/10.1016/j.aap.2012.05.003>.
- Heck, K. E., & Carlos, R. M. (2008). Passenger distractions among adolescent drivers. *Journal of Safety Research*, 39(4), 437–443.
- Hogg, M. A., Turner, J. C., & Davidson, B. (1990). Polarized norms and social frames of reference: A test of the self-categorization theory of group polarization. *Basic & Applied Social Psychology*, 11(1), 77–100.
- Horvath, C., Lewis, I., & Watson, B. (2012). Peer passenger identity and passenger pressure on young drivers' speeding intentions. *Transportation Research Part F: Traffic Psychology and Behaviour*, 15(1), 52–64. <http://dx.doi.org/10.1016/j.trf.2011.11.008>.
- Killgore, W. D., Kelley, A., & Balkin, T. J. (2010). So you think you're bulletproof: Development and validation of the Invincibility Belief Index (IBI). *Military Medicine*, 175(7), 499–508.
- Laapotti, S., & Keskinen, E. (1998). Differences in fatal loss-of-control accidents between young male and female drivers. *Accident Analysis and Prevention*, 30(4), 435–442.
- Laapotti, S., Keskinen, E., & Rajalin, S. (2003). Comparison of young male and female drivers' attitude and self-reported traffic behaviour in Finland in 1978 and 2001. *Journal of Safety Research*, 34(5), 579–587. <http://dx.doi.org/10.1016/j.jsr.2003.05.007>.
- Lam, L. T. (2003). Factors associated with young drivers' car crash injury: comparisons among learner, provisional, and full licensees. *Accident Analysis and Prevention*, 35(6), 913–920. [http://dx.doi.org/10.1016/S0001-4575\(02\)00099-4](http://dx.doi.org/10.1016/S0001-4575(02)00099-4).
- Lambert-Bélanger, A., Dubois, S., Weaver, B., Mullen, N., & Bédard, M. (2012). Aggressive driving behaviour in young drivers (aged 16 through 25) involved in fatal crashes. *Journal of Safety Research*, 43(5–6), 333–338. <http://dx.doi.org/10.1016/j.jsr.2012.10.011>.
- Lee, C., & Abdel-Aty, M. (2008). Presence of passengers: does it increase or reduce driver's crash potential? *Accident Analysis and Prevention*, 40(5), 1703–1712.
- Letirand, F., & Delhomme, P. (2005). Speed behaviour as a choice between observing and exceeding the speed limit. *Transportation Research Part F: Traffic Psychology and Behaviour*, 8(6), 481–492.
- McKelvie, S. J., & Schamer, L. A. (1988). Effects of night, passengers, and sex on driver behavior at stop signs. *The Journal of Social Psychology*, 128(5), 685–690.
- McKenna, F. P., Waylen, A. E., & Burkes, M. E. (1998). *Male and female drivers: How different are they?* The University of Reading: AA Foundation for Road Safety Research.
- McKnight, A. J., & McKnight, A. S. (2003). Young novice drivers: careless or clueless? *Accident Analysis and Prevention*, 35(6), 921–925.

- Meadows, M. L., & Stradling, G. S. (2000). Are women better drivers than men? Tools for measuring driver behaviour. In J. Hartley & A. Branthwaite (Eds.), *The Applied Psychologist* (2nd ed., Open University Press).
- Mirman, J. H., Albert, D., Jacobsohn, L. S., & Winston, F. K. (2012). Factors associated with adolescents' propensity to drive with multiple passengers and to engage in risky driving behaviors. *Journal of Adolescent Health, 50*(6), 634–640. <http://dx.doi.org/10.1016/j.jadohealth.2011.10.256>.
- Møller, M., & Hausteijn, S. (2014). Peer influence on speeding behaviour among male drivers aged 18 and 28. *Accident Analysis and Prevention, 64*, 92–99. <http://dx.doi.org/10.1016/j.aap.2013.11.009>.
- National Highway Traffic Safety Administration. (2008). Traffic safety facts data – occupant protection.
- ONISR (2006). *Le bilan 2005 de la sécurité routière en France [Road safety overview for 2005 in France]*. Paris: La documentation française.
- ONISR (2014). *Le bilan 2013 de la sécurité routière en France [Road safety overview for 2013 in France]*. Paris: La documentation française.
- Organization for Economic Development and Cooperation. (2006). Young Drivers the Road to Safety.
- Ozkan, T., Lajunen, T., Chliaoutakis, J., Parker, D., & Summala, H. (2006). Cross-cultural differences in driving behaviours: A comparison of six countries. *Transportation Research Part F: Traffic Psychology and Behaviour, 9*(3), 227–242.
- Peden, M., Scurfield, R., Sleet, D., Mohan, D., Hyder, A. A., Jarawan, E., et al (2004). *World report on road traffic injury prevention*. Geneva: World Health Organization.
- Pradhan, A. K., Li, K., Bingham, C. R., Simons-Morton, B. G., Ouimet, M. C., & Shope, J. T. (2014). Peer passenger influences on male adolescent drivers' visual scanning behavior during simulated driving. *Journal of Adolescent Health, 54*(Suppl. 5), S42–S49. <http://dx.doi.org/10.1016/j.jadohealth.2014.01.004>.
- Preusser, D. F., Ferguson, S. A., & Williams, A. F. (1998). The effect of teenage passengers on the fatal crash risk of teenage drivers. *Accident Analysis and Prevention, 30*(2), 217–222.
- Reason, J., Manstead, A., Stradling, S., Baxter, J., & Campbell, K. (1990). Errors and violations on the roads: A real distinction? *Ergonomics, 33*(10), 1315–1332.
- Rivis, A., Abraham, C., & Snook, S. (2011). Understanding young and older male drivers' willingness to drive while intoxicated: The predictive utility of constructs specified by the theory of planned behaviour and the prototype willingness model. *British Journal of Health Psychology, 16*(2), 445–456.
- Rolls, G., & Ingham, R. (1992). 'Safe' and 'unsafe' – a comparative study of younger male drivers. London: AA Foundation for Road Safety Research.
- Rueda-Domingo, T., Lardelli-Claret, P., Dios Luna-del-Castillo, J., Jiménez-Moleón, J. J., García-Martin, M., & Bueno-Cavanillas, A. (2004). The influence of passengers on the risk of the driver causing a car collision in Spain analysis of collisions from 1990 to 1999. *Accident Analysis and Prevention, 36*(3), 481–489.
- Schmid, M., Sieverding, M., Esslen, M., Graber, K., & Jäncke, L. (2008). Masculinity causes speeding in young men. *Accident Analysis and Prevention, 40*(2), 840–842. <http://dx.doi.org/10.1016/j.aap.2007.09.028>.
- Scott-Parker, B., Watson, B., & King, M. J. (2009). Understanding the psychosocial factors influencing the risky behaviour of young drivers. *Transportation Research Part F: Traffic Psychology and Behaviour, 12*(6), 470–482.
- Scott-Parker, B., Watson, B., King, M. J., & Hyde, M. K. (2013). A further exploration of sensation seeking propensity, reward sensitivity, depression, anxiety, and the risky behaviour of young novice drivers in a structural equation model. *Accident Analysis and Prevention, 50*, 465–471. <http://dx.doi.org/10.1016/j.aap.2012.05.027>.
- Sela-Shayovitz, R. (2008). Young drivers' perceptions of peer pressure, driving under the influence of alcohol and drugs, and involvement in road accidents. *Criminal Justice Studies, 21*(1), 3–14. <http://dx.doi.org/10.1080/14786010801972639>.
- Shepherd, J. L., Lane, D. J., Tapscott, R. L., & Gentile, D. A. (2011). Susceptible to social influence: Risky "Driving" in response to peer pressure. *Journal of Applied Social Psychology, 41*(4), 773–797.
- Simons-Morton, B. G., Lerner, N., & Singer, J. (2005). The observed effects of teenage passengers on the risky driving behavior of teenage drivers. *Accident Analysis and Prevention, 37*(6), 973–982.
- Simons-Morton, B. G., Ouimet, M. C., Zhang, Z., Klauer, S. E., Lee, S. E., Wang, J., et al (2011). The effect of passengers and risk-taking friends on risky driving and crashes/near crashes among novice teenagers. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine, 49*(6), 587–593.
- Smith, J. R., & Louis, W. R. (2008). Do as we say and as we do: The interplay of descriptive and injunctive group norms in the attitude-behaviour relationship. *British Journal of Social Psychology, 47*(4), 647–666.
- Stradling, S. G., Campbell, M., Allan, I., Gorell, R., Hill, J., Winter, M., & Hope, S. (2003). The speeding driver: who, how and why?
- Tajfel, H. (1982). Social psychology of intergroup relations. *Annual Review of Psychology, 33*(1), 1–39. <http://dx.doi.org/10.1146/annurev.ps.33.020182.000245>.
- Terry, D. J., Hogg, M. A., & White, K. M. (2000). Attitude-behavior relations: social identity and group membership. In D. J. Terry & M. A. Hogg (Eds.), *Attitudes, behavior, and social context: The role of norms and group membership* (pp. 67–93). Mahwah, NJ, US: Lawrence Erlbaum Associates.
- Turner, J. C. H., Michael, A., Oakes, Penelope J., Reicher, Stephen D., & Wetherell, Margaret S. (1987). *Rediscovering the social group: A self-categorization theory*. Cambridge, MA, US: Basil Blackwell.
- Vollrath, M., Meilinger, T., & Krüger, H.-P. (2002). How the presence of passengers influences the risk of a collision with another vehicle. *Accident Analysis and Prevention, 34*(5), 649–654.
- Wallén Warner, H., & Åberg, L. (2008). Drivers' beliefs about exceeding the speed limits. *Transportation Research Part F: Traffic Psychology and Behaviour, 11* (5), 376–389. <http://dx.doi.org/10.1016/j.trf.2008.03.002>.
- Wickens, C. M., Mann, R. E., Stoduto, G., Ialomiteanu, A., & Smart, R. G. (2011). Age group differences in self-reported aggressive driving perpetration and victimization. *Transportation Research Part F: Traffic Psychology and Behaviour*.
- Williams, A. F. (2003). Teenage drivers: Patterns of risk. *Journal of Safety Research, 34*(1), 5–15.
- Williams, L. R., Davies, D. R., Thiele, K., Davidson, J. R., & MacLean, A. W. (2012). Young drivers' perceptions of culpability of sleep-deprived versus drinking drivers. *Journal of Safety Research, 43*(2), 115–122.
- Williams, A. F., Preusser, D. F., Ferguson, S. A., & Ulmer, R. G. (1997). Analysis of the fatal crash involvements of 15-year-old drivers. *Journal of Safety Research, 28*(1), 49–54. [http://dx.doi.org/10.1016/S0022-4375\(96\)00033-3](http://dx.doi.org/10.1016/S0022-4375(96)00033-3).
- Wingfield, N., Kelly, N., Serdar, K., Shiviy, V. A., & Mazzeo, S. E. (2011). College students' perceptions of individuals with anorexia and bulimia nervosa. *International Journal of Eating Disorders, 44*(4), 369–375. <http://dx.doi.org/10.1002/eat.20824>.