

## Intentionality, anger, coping, and ego defensiveness in reactive aggressive driving

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### Abstract

A motivational sequence was used as a theoretical framework for studying reactive aggressive driving. Study 1 tested the validity of the sequence “perceived intentionality-anger-reactive aggressive driving” and assessed the impact of coping on anger and reactive aggressive driving. The ecological validity of the same sequence was verified in Study 2 with a large sample of adult drivers, while examining the role of ego defensiveness as a determinant of anger and aggressive driving. Study 1 showed the proposed sequence was supported and that coping strategies intervened at both anger and reaction levels, depending if the situation was perceived as intentional or not. Study 2 showed that anger mediated the impact of coping and ego defensiveness on driving aggression. Sobel tests confirmed the anger mediation effect in both studies.

Aggressive driving is a common occurrence. Surveys have shown that as many as 60% of drivers admit to having lost their emotional control while driving (e.g., Joint, 1995). Thus, it is not surprising that up to 88% of drivers who participated in an extensive survey conducted in the United Kingdom reported having witnessed aggressive driving the previous year (Lex Report Motoring, 1996). Surveys in Canada and in the United States (e.g., AAA Foundation for Traffic Safety, 2008; Smart, Mann, & Stoduto, 2003; Wells-Parker et al., 2002) have shown similar figures. Given that research has systematically found a relation between aggressive driving and motor vehicle accidents (Cook, Knight, & Olson, 2005; Matthews, Dorn, & Glendon, 1991; Mayer & Treat, 1987; National Highway Traffic Safety Administration, 2006), it is important that further research be conducted on the topic.

Among the various definitions of aggressive driving, the one proposed by Galovski, Malta, and Blanchard (2006) is comprehensive in that it both defines driving aggression as a behavior whose underlying purpose is to attack, coerce or harm someone, ignoring the person's rights and safety, and pertains to the various ways aggressive driving is exhibited. Furthermore, it excludes types of driving behavior that are not considered aggressive (driving errors, for example), although victims of such errors may perceive themselves as

victims of aggressive driving. Further, a distinction can be drawn between proactive aggressive driving, where a driver's action serves as a mean to an end (e.g., tailgating in order to get someone out of the way), and reactive aggressive driving which happens when the driver, out of frustration, reacts aggressively to another driver perceived as hostile (e.g., honking back to a driver who was honking).

The majority of studies conducted on aggressive driving have examined the relation between aggressive driving and various types of factors (e.g., environmental, interpersonal, intrapersonal) but rarely have they focused on the psychological process that leads to aggressive driving. One such study, conducted by Parker, Lajunen, and Stradling (1998), used the theory of planned behavior (TPB; Azjen, 1988) to predict reactive and proactive aggressive driving. According to the TPB, a specific behavior can be predicted by the intention to perform that behavior, which, in turn, depends on attitudes, perceived control, and subjective norms toward that behavior. For example, the intention to tailgate others drivers will be higher if one thinks it is all right to tailgate (positive attitude), one feels one can easily tailgate in many situations (perceived control), and if one believes those close to one would agree with tailgating (subjective norms). Parker and her colleagues also added affective attitudes to the cognitive attitudes postulated by the TPB. Parker et al. (1998)

found that TPB variables (attitudes, beliefs, norms, and affective attitudes) were better predictors of proactive than of reactive aggressive driving.

Of the few theories that have specifically addressed the psychological process underlying reactive behaviors, Weiner's theory of social conduct (1995, 2000, 2006) depicts retaliation or reactive aggression as the result of a psychological process that begins with thoughts, followed by affects and ends with the reaction, with affects playing a mediating role (Weiner, 2006). For instance, in the case of an altercation between two drivers, the theory of social conduct would hypothesize that the frustrated driver will seek to understand why the infuriating driver acted or maneuvered the way he or she did. Depending on the cause attributed (and the level of controllability or intentionality implied by the cause), the more a frustrated driver perceives another driver's infuriating maneuver or action as controllable or intentional, the more the frustrated driver will deem the other driver responsible. In turn, the more responsible the wrongdoer is perceived, the angrier the frustrated driver will be and the higher the probability of retaliation. In cases where the infuriating driver is perceived as less or not responsible, for example, if the frustrated driver realizes/discovers that the infuriating driver is hurrying a pregnant woman to the hospital, he or she could feel sympathy, and the probability of retaliation would be low. Help could even be offered. Thus, the theory applies to both help giving and reactive aggression. Finally, Weiner (2006) also acknowledges that any mitigating circumstances may limit responsibility judgments. According to the theory of social conduct, reactive aggression is therefore the result of an interpersonal sequential process that begins with causal attribution and perceptions of intent, which leads to an inference of personal responsibility, which in turn gives rise to affect (anger or sympathy), engendering the social reaction (Weiner, 2006).

Numerous studies have tested the attributional sequence "Controllability→Anger/Sympathy→Aggression/Help" and have shown good empirical support. In a meta-analytic review of research on help giving and aggression done from an attributional perspective, Rudolph, Roesch, Greitemeyer, and Weiner (2004) found that the attributional sequence predicted both help giving and reactive aggression. However, in the case of help giving, affect fully mediated the relationship between controllability and help giving. In cases of retaliatory aggression, mediation was only partial because controllability was both directly and indirectly related to aggression through affect. Thus, for help giving, there is one proximal determinant (affect—anger or sympathy) and one distant determinant (thought—controllability), whereas for aggression, both determinants are proximate (Rudolph et al., 2004; Weiner, 2006). Furthermore, although the attributional model is an excellent fit for the aggression and help giving data, in the case of the aggression model, the data is best rep-

resented when there is an additional direct link between controllability and aggression, over and above its indirect relation through anger (Rudolph et al., 2004). Thus, in reactive aggression, controllability is both a distant and proximate determinant.

To our knowledge, two studies have looked at reactive aggressive driving from an attributional perspective. One is a study by Britt and Garrity (2006), who examined the role of three causal dimensions (locus, stability, and globality) and two types of attributions (blame and hostility) in predicting driving anger and road rage reactions in hypothetical situations. Their final results showed that stability was the only causal dimension consistently significant in the hypothetical situations tested. Furthermore, it was significant with both hostile attributions and blame attributions, depending on the situation and whether anger or aggressive behavior was the criterion variable. Thus, no clear picture emerged of a simple motivational process leading to aggressive driving. This could be due to the fact that the situations tested were not manipulated and that attribution, not anger, was the mediating variable assessed. Moreover, included in the measured attributional variables were conceptually different variables all treated at the same level: causal dimensions, blame, and hostility attributions. These conceptual differences may explain the inconsistent results obtained in that study. In addition, no sequences were postulated and tested, and anger and behaviors were both examined as criterion variables. Finally, neither intentionality nor controllability was included as causal dimensions even though research has shown that they are key causal dimensions relative to reactive aggression (Weiner, 2006). Further research is thus needed to better understand the motivational process that leads to reactive aggressive driving.

In another study on reactive aggressive driving, Vallières, Bergeron, and Vallerand (2005) tested a simpler attributional sequence of Weiner's model (Weiner, 1986, 1995, 2000, 2006), and less complex than the one used by Britt and Garrity (2006). Rather than looking at controllability, responsibility, locus, stability, globality, or blame judgments, Vallières and colleagues focused on the following sequence "Intentionality→Anger→Reactive aggressive driving." This simple attributional sequence is inspired by research conducted on reactive aggression, either in laboratory studies (e.g., Dyck & Rule, 1978) or with aggressive children (Dodge & Coie, 1987; Dodge & Crick, 1990), which can be summed up by an intent-retaliation sequence (Weiner, 2006), and by research exploring the mediating role of anger in aggressive retaliation (Rudolph et al., 2004; Weiner, 1986). It was tested with hypothetical situations and the hypothesis was confirmed. These results imply that in the context of frustrating driving incidents, a simple motivational sequence beginning with perceived intentionality will induce anger, which in turn will lead to an aggressive reaction. These authors suggest that

when reactive aggressive driving occurs, the protagonists' actions and reactions happen too suddenly and rapidly for complex cognitive inferences such as responsibility or blame judgments to play a mediating role.

However, even if numerous drivers admit to having experienced driving anger or losing their emotional control while driving (Joint, 1995; Parker, Lajunen, & Summala, 2002; Underwood, Chapman, Wright, & Crundall, 1999), many do not react aggressively. Coping skills could explain why some react aggressively while others do not. Indeed, some frustrated drivers may adopt a rational posture or do some self-talk in order to lower their emotional frustration (e.g., "In such a situation, I think about something else" or "I try to think about positive action"). Consequently, coping strategies, which are amenable to treatment (Deffenbacher, Filetti, Lynch, Dahlen, & Oetting, 2002; Deffenbacher, Hull, Lynch, Oetting, & Salvatore, 2001; Galovski & Blanchard, 2004), may also play a role in a motivational sequence leading to reactive aggressive driving. To our knowledge, no reported studies on Weiner's motivational sequence included and assessed the role of coping strategies in the sequence, hence the relevance of assessing their role in the present research.

Finally, ego defensiveness, a trait-motivation variable, has been associated with reported anger and aggressive behaviors while driving (Neighbors, Vietor, & Knee, 2002), and with reported anger, subjective aggression, and aggressive action among parents in a sport situation (Goldstein & Iso-Ahola, 2008). Ego defensiveness can be defined as a way to protect one's self-concept when, in the face of a threat real or perceived, one feels one's self-esteem is at stake (Lapinski & Boster, 2001; Neighbors et al., 2002; Rosenberg, 1965, 1979; Ryan, 1982). In the Neighbors et al., study (2002) ego defensiveness was conceptualized and measured by the perception that the action of another driver was directed toward self, whereas in the Goldstein and Iso-Ahola study (2008) ego defensiveness was conceptualized and measured by the perception that the action of the other was directed toward oneself and one's child. It is therefore plausible to think that ego defensiveness in relation to aggressive driving could be conceptualized and measured as the perception that the action of another driver is directed toward oneself or toward one's car. Indeed, research has shown that attribution of anthropomorphic personality characteristics to one's vehicle is associated with reported aggressive driving (Benfield, Szlemko, & Bell, 2007). Consequently, the role of ego defensiveness was also explored.

## Present research

The purpose of our research was to advance previous work done on Weiner's motivational sequence (Rudolph et al., 2004; Weiner, 1995, 2000, 2006) and to investigate various aspects of the motivational process leading to aggressive reac-

tions. Study 1 tested the validity of the sequence "Perceived intentionality→Anger→Reactive aggressive driving," while also assessing the impact of coping on anger and reactive aggressive driving. In addition, in line with results obtained by Rudolph et al., (2004), we tested whether or not anger was a full or partial mediator. In doing so, the role of intentionality as a proximate determinant of aggression was also assessed. Study 2 tested the ecological validity of the same attributional sequence, including coping, with a large sample of community-dwelling adult drivers, using a real-life situation instead of hypothetical scenarios. Furthermore, the role of ego defensiveness as another determinant of anger and reactive aggressive driving was also investigated.

## Study 1

In this study, the attributional sequence "Perceived intentionality→Anger→Reactive driving aggression" was tested in two hypothetical scenarios, each one involving two drivers. The first driver (the infuriating driver) provokes a frustrating incident to which the participant (who plays the role of the second driver) reacts. The level of intentionality implied by the provoking driver's action differed in order to test whether the attributional sequence could explain driving aggression in both unintentional and intentional situations. In line with the results of the meta-analysis of Rudolph et al. (2004) relative to reactive aggression, we hypothesized that intentionality (thought) and anger (affect) would be proximate determinants of reactive aggressive driving. As for the role of coping, in line with previous results (Deffenbacher, Lynch, Oetting, & Swain, 2002), we hypothesized that it would be negatively related to anger and to reactive aggressive driving.

## Method

### Participants

Participants were 102 French-speaking undergraduate students: 67 men ( $M_{age} = 22.8$  years,  $SD = 4.8$ ), 32 women ( $M_{age} = 25.3$ ,  $SD = 7.1$ ), and 3 gender unspecified, from various departments in two universities. The average number of years of driving experience was 5.8 years ( $SD = 3.9$ ) and the participants had driven an average of 4.36 days a week in the last 12 months.

### Materials

#### Measures and ratings

Each questionnaire handed out contained either the unintentional scenario or the intentional scenario. Both scenarios were chosen based on the results of a pilot study. The

intentional scenario read as follow: “You are driving on the highway and traffic is moving freely. The driver in the car behind you is tailgating you. After a while, he passes you. As soon as he has passed you, he deliberately and abruptly slows down in front of you, and you almost ram into his car.”

The unintentional scenario describes the following situation: “You are in the passing lane, driving up a hill behind another vehicle. This other vehicle tries to pass a truck that is in the right lane, but the hill becomes steeper and he appears to be having trouble maintaining his speed. His engine is making odd noises. This situation means that you have to slow down and forget about trying to pass the truck for the time being.”

For each scenario, participants were asked to think of and write down a possible cause to explain that situation. They were then asked to assess the level of intentionality of the infuriating driver’s action (one item: “Do you think the other driver’s action was intentional?”). Participants also indicated the level of their anger feelings (one item: “Does the other driver’s manoeuvre make you feel angry?”). Aggressive driving reactions were assessed using eight items (“I yell insults,” “I say what I think of the other driver,” “I swear at the other driver,” “I send a message so the other driver understands,” “I honk,” “I behave in a hostile way”: “I try to take revenge one way or the other”; “I do a manoeuvre in order to concede nothing”:  $\alpha = .78$  and  $.86$ ). All variables were measured on an 11-point scale ranging from 0 (*not at all*) to 10 (*entirely*).

Drivers’ coping strategies were assessed using the 15 items of the coping subscale of the Driving Anger Expression Inventory (DAX; Deffenbacher, Lynch, et al., 2002), which has been found to correlate negatively with various measures of angry driving and trait-anger, aggressive driving, and unsafe driving (see, e.g., Dahlen & Ragan, 2004). To the question “What can you say, think or do when you are angry while driving?” participants had to indicate to what extent they use the following strategies (e.g., “I try to think about positive actions”). These items were measured on a 5-point scale ranging from 1 (*almost never*) to 5 (*almost always*;  $\alpha = .88$ ).

### Procedure

Participants were recruited during their regular classes. They were asked to participate in a study on driving behavior by

filling out a questionnaire. They were told that their answers would remain confidential and anonymous and that they were free to participate or not. All participants had a driver’s license. Once the questionnaire was completed, participants gave it back to the experimenter and were then debriefed before leaving the classroom. Prior to the study, the research and questionnaire had received approval from the ethical committee.

### Results and discussion

Analyses assessing gender differences indicated no significant differences on all the measures. Analysis of variance comparisons of the two conditions revealed significant differences for intentionality, anger and aggressive reactions. Participants in the intentional condition perceived the other driver’s action as more intentional ( $M = 7.06$ ,  $SD = 2.80$ ) than in the unintentional condition ( $M = 1.86$ ,  $SD = 2.30$ ),  $F(1, 100) = 104.84$ ,  $p < .001$ , reported more anger ( $M = 7.21$ ,  $SD = 2.59$  and  $M = 1.86$ ,  $SD = 2.30$ , respectively,  $F(1,100) = 104.84$ ,  $p < .001$ ), and higher levels of aggressive driving ( $M = 3.68$ ,  $SD = 1.87$  and  $M = 1.79$ ,  $SD = 1.85$ , respectively,  $F(1,100) = 26.35$ ,  $p < .001$ ). Participants’ coping strategy scores were similar for the two conditions ( $M = 4.52$ ,  $SD = 1.18$  and  $M = 4.59$ ,  $SD = 1.29$ , respectively,  $p > .05$ ). Table 1 shows correlation coefficients among the variables in each of the two scenarios. As can be seen, the coefficients reflect the hypothesized relations between the variables.

Sequential multiple regression analyses (path analyses) assessed the mediating role of anger and the impact of coping on anger and reported reactions of aggressive driving. Two series of analyses were conducted, one for each group, using a three-step procedure. At Step 1, perceived intentionality was first entered as a determinant of anger, followed by coping. At Step 2, reactive aggressive driving was the criterion variable, and intentionality and coping were entered in the equation. At Step 3, anger was entered as another predictor of reported reactive aggressive driving in order to assess its mediating effect.

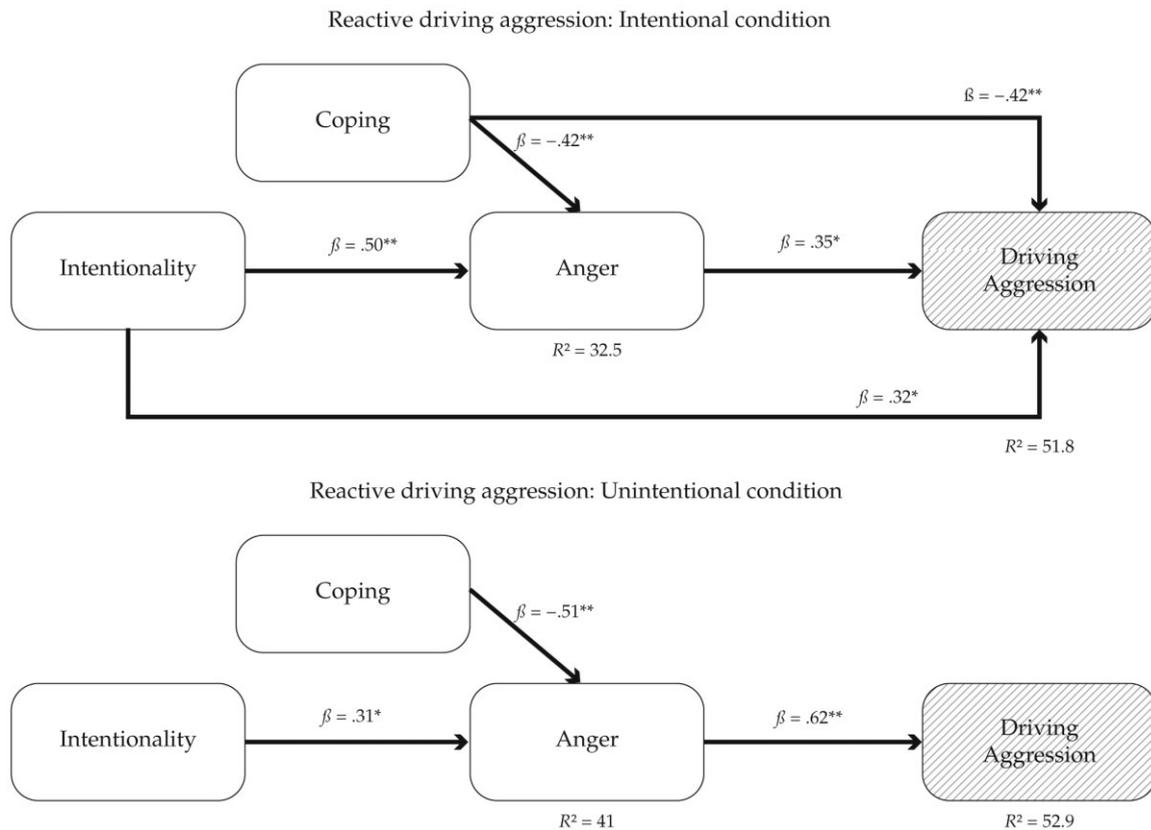
Results for the intentional condition (see upper part of Figure 1) show, as expected, that intentionality and coping had converse effects on anger, with intentionality leading to

**Table 1** Correlations Between the Variables in the Intentional and Unintentional Conditions: Study 1

	Intentionality	Coping	Anger	Aggressive driving
Intentionality	—	.17	.43***	.39**
Coping	-.25	—	-.34*	-.49***
Anger	.44***	-.59***	—	.63***
Aggressive driving	.43**	-.50***	.74***	—

Note. Coefficients for the intentional condition ( $n = 52$ ) are above the diagonal and coefficients for the unintentional condition ( $n = 48$ ) are below the diagonal.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .



**Figure 1** Beta coefficients for the pathways between intentionality, anger, coping, and self-reported aggressive driving behavior. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

more anger ( $\beta = .50, p < .001$ ) and coping strategies leading to less anger ( $\beta = -.42, p < .001$ ). These variables explained 17% and 16%, respectively, of reported anger variance. Second, the final paths with aggressive driving as the criterion variable revealed that intentionality ( $\beta = .49, p < .001$ ) and coping ( $\beta = -.57, p < .001$ ), both contributed significantly to explaining reported driving aggression. Thirdly, although introducing anger into the equation ( $\beta = .35, p < .01$ ) lessened their effects, intentionality ( $\beta = .32, p < .01$ ), and coping ( $\beta = -.42, p < .001$ ), still were related directly to reported driving aggression  $F(3, 48) = 19.3, p < .001$ , thus indicating partial mediation for anger. Sobel test (Sobel, 1982) confirmed that the direct relation between perceived intentionality ( $z = 2.67, p < .01$ ) or coping ( $z = -2.19, p < .05$ ) and aggressive driving reaction were both partially mediated by anger feelings.

Analyses for the unintentional condition revealed similar results, with slight differences. With anger as the criterion variable, results again showed significant reverse betas for intentionality, ( $\beta = .31, p < .01$ ) and coping, ( $\beta = -.51, p < .001$ ). Together, these variables explained 41% of anger variance,  $F(2, 45) = 17.33, p < .001$ . Results with reported

aggressive driving as the dependant variable revealed that both intentionality and coping were significant predictors of aggressive driving ( $\beta = .32$  and  $\beta = -.41$ , respectively). However, once anger was entered in the equation ( $\beta = .62, p < .001$ ), neither intentionality ( $\beta = .13, ns; z = 2.98, p < .001$ ) nor coping ( $\beta = -.10, ns; z = -3.70, p < .001$ ) remained significant (see lower part of Figure 1). In sum, although intentionality combined with coping strategies were significantly related to reported aggressive driving, with coping contributing 16.0% of the additional variance above and beyond that of perceived intentionality (18.0%), the final path showed that their effect was fully mediated through anger, once this variable was entered in the equation,  $F(3, 44) = 18.61, p < .001$ .

These results support the validity of the attributional sequence "Perceived intentionality→Anger→Reactive aggression" as it pertains to reactive aggressive driving. They also indicate that in order to have a full portrait of the process leading to aggressive driving coping strategies should be added in the sequence. The results also suggest that when a frustrating driving incident occurs, the way frustrated drivers react depends in part on how intentional they perceive the

action of the infuriating driver. When the action of the infuriating driver is perceived as intentional, our results show that reactive aggressive driving is determined by both anger and intentionality. In that sense, these results corroborate and extend the results of the meta-analytic review by Rudolph et al., (2004), who found that thoughts are both distant and proximate determinants of reactive aggression: In other words, that anger plays a partial mediating role, with intentionality also being directly related to reported aggressive driving. However, when the frustrating action is perceived as nonintentional, Weiner's proposed sequence with anger as a full mediator applies, and as was found with help giving research (Rudolph et al., 2004).

Our results also showed that the role of coping varies depending on the context. In the intentional condition, coping was both directly and indirectly negatively related to reactive driving aggression, whereas in the unintentional condition, the relation was mediated by anger. In sum, results from Study 1 suggest that in order to truly understand the process leading to aggressive reactions, more attention should be given to the level of intentionality attributed to the wrongdoer and the coping strategies of those involved.

## Study 2

The main goal of Study 2 was to replicate the results of Study 1 with an ecologically valid sample of community-dwelling adult drivers, with only one difference: No comparison was made between high and low perceived intentionality. A second objective was to test the sequence with real-life situations instead of hypothetical scenarios. The participants were asked to recall a frustrating driving incident they had experienced and to complete the questionnaire relative to that incident. Another objective was to ascertain whether ego defensiveness, a personal variable, would arouse driving anger in frustrating driving incidents. Contrary to Study 1, no comparison was made between low and high intentionality conditions.

In their study on aggressive driving, Neighbors et al. (2002) have shown that ego defensiveness was directly associated with increased anger and, by extension, aggressive driving in response to specific driving events. As hypothesized, the mediating role of anger between ego defensiveness and aggressive driving was validated. However, they did not measure how cognitive variables such as perceived intentionality could also determine anger and, by extension, aggressive reactions over and above ego defensiveness. Therefore, such as suggested by Neighbors and his colleagues, the role of intentionality, together with ego defensiveness, was explored. We propose that ego defensiveness is activated not only when an individual feels he or she is the target of another driver's action, but also when the individual feels that his or her vehicle is a target. Thus, when frustrating incidents occur on

the road because a driver's vehicle is considered part of his or her identity, any action on the part of another driver that could possibly harm that vehicle should even further trigger anger and driving aggression.

In line with previous findings (Neighbors et al., 2002), we hypothesized that ego defensiveness, with intentionality, would be positively and directly associated with driving anger and indirectly associated with driving aggression, whereas coping would be negatively associated with anger and driving aggression.

## Method

### Participants

Study 2 was composed of a random sample of 458 middle-aged adult drivers (262 females and 193 males, 3 gender missing data) from the Greater Montreal area (Quebec, Canada). Participants were aged between 20 and 87 years with a mean age of 47.79 years ( $SD = 14.90$ ). They had been driving for an average of 27.89 years ( $SD = 13.72$ ) and drove 17,473.66 kilometers per year ( $SD = 14,411.34$  km).

### Materials

#### Questionnaire

The questionnaire used in Study 2 was very similar to the one used in the previous study with minor differences. Instead of scenarios, the following instructions were given to the participants: "Describe in a few words a bothering situation that you have lived recently while driving and involving another driver" and complete the questionnaire with that incident in mind. No other instructions were given as to the type of incident or the type of driver they should recall. Thus, the measures, which were taken from a broader study on passion and aggressive driving, were identical to the ones used in Study 1, except for the addition of one item assessing ego defensiveness ("On the road, people who do something to my vehicle (e.g., cutting me off) are also doing it to me"). All items were measured such as in Study 1 on an 11-point scale ranging from 0 (*not at all*) to 10 (*entirely*). Cronbach's alphas for the aggressive driving scale and the DAX coping subscale were .72 and .89, respectively.

### Procedure

For Study 2, 1,500 questionnaires with prestamped return envelopes were sent through the Société de l'Assurance Automobile du Québec-SAAQ (the Provincial organization that issues driver's licenses in the province of Quebec, Canada) to a random sample of 1,500 individuals living in the Greater Montreal area. The participants were selected from the SAAQ database. Each person received the questionnaire and a letter explaining the general purpose of the study. Participants were

told that the aim of the study was to learn more about people’s driving behavior. They were told that participation was voluntary, and that their answers would remain confidential and anonymous and would not be sent to the SAAQ. In all, 193 men and 265 women (total = 458) returned their questionnaire fully completed (response rate: 31%).

**Results and discussion**

As in Study 1, there were no significant gender differences for the variables measured. Results show that the field study participants assessed the action of the other driver as intentional ( $M = 6.76, SD = 3.84$ ) and it made them angry ( $M = 5.90, SD = 3.50$ ). They also reported aggressive driving ( $M = 1.89, SD = 1.80$ ) and the use of coping strategies ( $M = 3.60, SD = 1.07$ ).

Results of correlations among variables are shown in Table 2: Intentionality is only associated with feelings of anger, whereas ego defensiveness and coping are both related to anger and to aggressive driving. In light of these correlations, the same sequence as the one tested in Study 1 was validated with this general population of drivers, with the

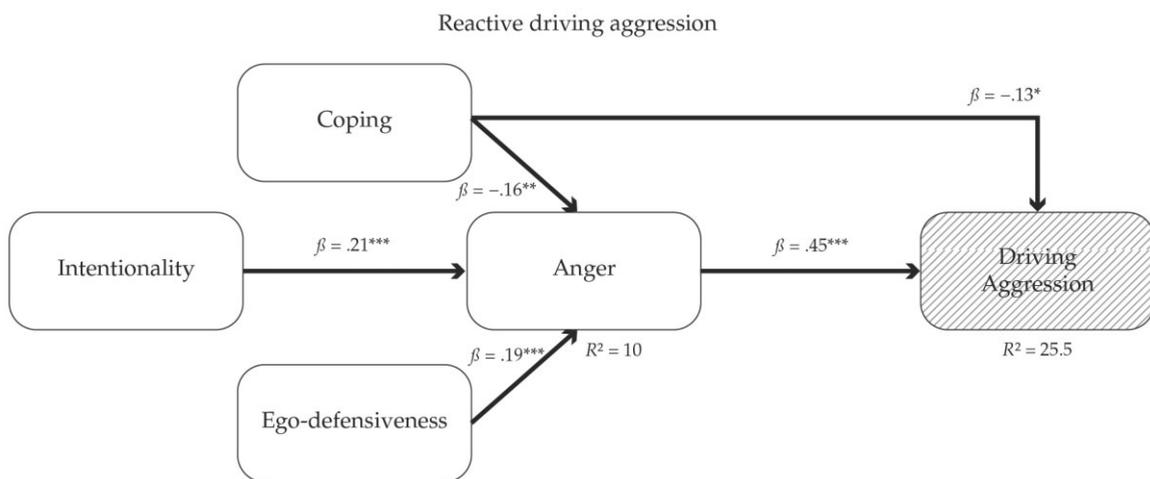
addition of ego defensiveness right at the first step, together with intentionality and coping. As in Study 1, anger was the criterion variable for the first series of analyses and reactive driving aggression for the second series. Figure 2 presents the results of these analyses.

Regressions conducted initially with anger as the criterion variable reveal that the three variables—intentionality, driver ego defensiveness, and coping—predicted anger. The higher the driver ego defensiveness, ( $\beta = .19, p < .001$ ), the more the action of the other driver perceived as intentional, ( $\beta = .21, p < .001$ ), the lower the driver coping strategies ( $\beta = -.16, p < .001$ ), the more anger reported. Results of the regression on reactive aggressive driving, initially without anger as a predictor, show that driver ego defensiveness ( $\beta = .19, p < .001$ ) and coping ( $\beta = -.19, p < .001$ ) are significantly related to aggressive driving; corroborating the correlation results, intentionality did not reach significance ( $\beta = .05, ns$ ). Once anger was entered (and intentionality excluded), results show that ego defensiveness is no longer significant ( $\beta = .10, ns; z = 4.17, p < .001$ ), indicating that anger is acting as a complete mediator, ( $\beta = .45, p < .001$ ). As for coping, the relation with aggressive reaction was reduced but stayed significant

**Table 2** Correlations Between the Variables in Study 2

	Intentionality	Ego defensiveness	Coping	Anger	Reactive aggression
Intentionality	—	.12**	-.05	.24***	.08
Ego defensiveness		—	-.14**	.24***	.22***
Coping			—	.19***	-.22***
Anger				—	.49***
Reactive aggression					—

Note.  $n = 458$ .  
\*\* $p < .01$ . \*\*\* $p < .001$ .



**Figure 2** Beta coefficients for the pathways between intentionality, ego defensiveness, anger, coping, and self-reported aggressive driving behavior. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

( $\beta = -13, p < .01; z = -3.322, p < .001$ ), indicating in this case that anger acted as a partial mediator. Together, these variables explain 25% of the variance of reported aggressive driving.

These findings provide support for the ecological validity of the attributional sequence “Perceived intentionality→Anger→Reactive aggression” relative to reactive aggressive driving among a sample of drivers of all ages drawn from the general population. They also give support to the role played by coping in lowering driving anger and reactive aggression. Finally, it shows that a personal variable such as ego defensiveness intervenes in the process leading to that type of aggressive driving.

## General discussion

The purpose of the present research was to look at various aspects of a motivational sequence leading to aggressive reactions. A first objective was to validate the “Perceived intentionality→Anger→Reactive aggressive driving” sequence, and assess the relation between coping, anger and reactive aggressive driving. The second objective was to verify if anger acted a partial mediator between intentionality and aggressive reactions, thus replicating the findings of Rudolph et al., (2004), or if it acted as a perfect mediator such as proposed by Weiner’s theory of social conduct (1995, 2000, 2006). In assessing the role of anger as a mediator, the role of intentionality as a distant and a proximate determinant of aggression was also verified. A third objective was to assess the ecological validity of the same motivational sequence in a real-life situation and to examine the role of ego defensiveness as a determinant of anger and aggressive driving, together with intentionality and coping.

Many findings emerged from the two studies. Relative to our first and second objectives, which are interrelated, our results support the postulated sequence with coping. They also corroborate the meta-analysis findings of Rudolph et al. (2004) relative to reactive aggression, while also offering some theoretical clarification relative to the questions that had remained unanswered. Indeed, Study 1 results demonstrate, as theirs did, that intentionality is both a proximate and a distant determinant of reactive aggression when the wrongdoer is perceived as having acted intentionally. However, when the context suggests that the incident is clearly nonintentional and that the infuriating action is perceived as less intentional, intentionality is completely mediated by anger, as Weiner’s theory of social conduct predicts (2006), and as found by Rudolph et al. (2004) in the helping behavior studies they reviewed. Therefore, the present results suggest that future research on reactive aggression should pay close attention to the level of intentionality the reactive aggressor attributes to the frustrating protagonist.

As for the determining role of coping strategies on anger and reactive aggressive driving, our findings show that coping is directly related to anger in all the situations investigated. In addition, they shed light on situations where coping intervenes directly not only on anger but also on reported aggressive driving. The results suggest that, once again, it depends on the level of perceived intentionality attributed to the infuriating driver: The more intentional the action of the infuriating driver is perceived, the more coping will be needed to directly alleviate both the aggressive reaction and anger feelings. Conversely, in situations perceived as less intentional as the one depicted in Study 1, anger fully mediates between coping and aggressive driving reactions. In sum, our results demonstrate that coping is an important factor in mitigating anger and reactive aggressive behavior, at least in the context of driving and that it should be included in a motivational sequence depicting the process leading to that type of aggressive reactions.

Our third objective was to verify the ecological validity of the sequence tested in Study 1 and examine the role of ego defensiveness. The Study 2 results support the ecological validity of the postulated sequence with a sample of drivers drawn from the general population. As for ego defensiveness, it was defined more extensively in the present study than in Neighbors et al. (2002), in that it included the perception that if one’s vehicle is the target of another driver, then one feels personally targeted. In spite of this slight conceptual difference, our findings are in line with the results of Neighbors et al. (2002) and show that ego defensiveness has an impact on driving anger and aggression above and beyond that of intentionality and coping.

A first implication of the present findings is that they strongly support the sequence proposed, which includes coping strategies, as shown by the percentage of variance of reactive aggressive driving explained by intentionality, coping, and anger in both conditions of Study 1 (52%) and in Study 2 (26%). They also confirm the mediating role of anger between intentionality and coping relative to reactive aggressive driving, albeit only partially, as seen in the intentional condition. The fact that our results corroborate those of Rudolph et al. (2004) regarding the direct link between perceived intentionality and aggressive reaction in the intentional condition gives even further credit (see also Weiner, 2006) to their hypothesis that the consequences of retaliating toward an infuriating driver can be costly for self, as the target may strike back. Thus, the importance of reacting not only on the basis of one’s feelings but also on the basis of one’s thoughts, particularly when the infuriating driver is perceived as having acted intentionally. In that sense, the present results concur with Weiner (2006), who suggests that thoughts, as proximal determinants in hostile contexts, can prove functional in terms of personal survival. Our results also show that in the intentional condition, coping strategies restrain not

only anger feelings but also aggressive driving reactions. In frustrating contexts perceived as unintentional (situations therefore perceived as less threatening), neither thoughts nor coping strategies need be directly associated with the aggressive driving reaction.

A second implication of the present findings is that ego defensiveness may be a key personal variable in reactive aggressive driving. In line with the previous findings of Neighbors et al. (2002), our results underscore the role of ego defensiveness in predicting anger, and the subsequent mediating role of anger between driving ego defensiveness and reactive aggressive driving. Thus, future research looking at personal factors involved in reactive aggressive driving should take that variable into consideration.

A third implication of the present findings is that research on aggressive reactions in general should maybe look systematically at how intentional a reactive aggressor perceives and interprets the action of a frustrating protagonist in addition to his or her coping strategies, so as to get a better understanding of the motivational process.

In spite of the fact that our results confirmed the hypotheses put forward, there are limitations to the present research. The two studies were conducted using a questionnaire method, hypothetical situations, and retrospective incidents; it is thus possible that results obtained using other procedures closer to real-life situations would have been different. For example, a diary procedure or a study conducted using a driving simulator might have yielded different results. Such closer-to-real-life procedures would also mean that more objective measures of anger could be used, i.e., physiological indicators or observation measures.

Furthermore, the small number of participants in Study 1, the methodology used, and the fact of having only one item to measure some of the constructs (e.g., ego defensiveness, anger) are additional limitations of the present research. Moreover, correlation studies do not provide a true

test of the predictive value of the sequence. It would be important that future research tries to overcome these shortcomings by conducting studies with the proposed sequence with a greater number of participants, using other methodologies, and a prospective design, with more items to measure the constructs, while exploring how specific contexts can intervene by halting or triggering reactive aggressive driving.

From a theoretical perspective, it would be important to retest the “Perceived intentionality→Anger→Reactive aggressive driving” sequence, with coping as an additional intervening variable, in frustrating situations other than driving and where the level of intentionality involved would vary. Such studies would enable us to verify if the perceived intentionality of a situation is indeed an important factor in determining which situations involve cognitions that are proximate determinants of reactive aggression, and when coping strategies intervene directly at the level of anger and aggression and when it is called upon only at the anger level.

In more practical terms, the present results suggest that, in addition to anger management, interventions with aggressive drivers should also address cognitive factors such as perceived intentionality and personal factors such as driver ego defensiveness.

Finally, the present results confirm the center role played by anger in reactive aggression. Indeed, even though anger is not always a full mediator, the fact that it mediates between intentionality, coping or ego defensiveness and reactive aggression shows it is a key variable in understanding the process leading to that type of aggression.

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## References

- AAA Foundation for Traffic Safety. (2008). 2008 Traffic Safety Culture Index. Washington, DC: AAA Foundation for Traffic Safety. Retrieved January 15, 2014, from <http://www.aaafoundation.org/pdf/2008TSCIndexFinalReport.pdf>
- Azjen, I. (1988). *Attitudes, personality and behavior*. Milton Keynes: Open University Press.
- Benfield, J. A., Szlemko, W. J., & Bell, P. A. (2007). Driver personality and anthropomorphic attribution relate to reported aggressive driving tendencies. *Personality and Individual Differences, 42*, 247–258.
- Britt, T. W., & Garrity, M. J. (2006). Attributions and personality as predictors of the road rage response. *British Journal of Social Psychology, 45*, 127–147.
- Cook, L. J., Knight, S., & Olson, L. M. (2005). A comparison of aggressive and DUI crashes. *Journal of Safety Research, 36*, 491–493.
- Dahlen, E. R., & Ragan, K. M. (2004). Validation of the Propensity for Angry Driving Scale. *Journal of Safety Research, 35*, 557–563.
- Deffenbacher, J. L., Filetti, L. B., Lynch, R. S., Dahlen, E. R., & Oetting, E. R. (2002). Cognitive-behavioral treatment of high anger drivers. *Behaviour Research and Therapy, 40*, 895–910.
- Deffenbacher, J. L., Hull, M. E., Lynch, R. S., Oetting, E. R., & Salvatore, N. F. (2001). Characteristics and treatment of high anger drivers. *Journal of Counseling Psychology, 47*, 5–17.
- Deffenbacher, J. L., Lynch, R. S., Oetting, E. R., & Swain, R. C. (2002). The Driving

- Anger Expression Inventory: A measure of how people express their anger on the road. *Behaviour Research and Therapy*, *40*, 717–737.
- Dodge, K. A., & Coie, J. D. (1987). Social-information-processing factors in reactive and proactive aggression in children's peer groups. *Journal of Personality and Social Psychology*, *53*, 1146–1158.
- Dodge, K. A., & Crick, N. (1990). Social-information processing biases of aggressive behaviour in children. *Personality and Social Psychology Bulletin*, *16*, 8–22.
- Dyck, R. J., & Rule, B. G. (1978). Effect of retaliation on causal attributions concerning attack. *Journal of Personality and Social Psychology*, *36*, 521–529.
- Galovski, T. A., & Blanchard, E. B. (2004). Road rage: A domain for psychological intervention? *Aggression and Violent Behaviour*, *9*, 105–127.
- Galovski, T. E., Malta, L. S., & Blanchard, E. B. (2006). Aggressive driving: Significance and scope of the problem. In T. E. Galovski, L. S. Malta, & E. B. Blanchard (Eds.), *Road rage: Assessment and treatment of the angry, aggressive driver* (pp. 3–14). Washington, DC: American Psychological Association. xi, 250.
- Goldstein, J. D., & Iso-Ahola, S. E. (2008). Determinants of parents' sideline-rage emotions and behaviours at youth soccer games. *Journal of Applied Social Psychology*, *38*, 1442–1462.
- Joint, M. (1995). *Road rage*. London: Automobile Association.
- Lapinski, M. A., & Boster, F. J. (2001). Modeling the ego-defensive function of attitudes. *Communication Monographs*, *68*, 314–324.
- Lex Report Motoring. (1996). *Lex report motoring*. London: Lex Motor Group.
- Matthews, G., Dorn, I., & Glendon, A. I. (1991). Personality correlates of driver stress. *Personality and Individual Differences*, *12*, 535–549.
- Mayer, R. R., & Treat, J. R. (1987). Psychological, social and cognitive characteristics of high-risk drivers: A pilot study. *Accident Analysis and Prevention*, *9*, 1–8.
- National Highway Traffic Safety Administration. (2006). The 100-car naturalistic driving study. Phase II-results of the 100-car field experiment. NHTSA report no. DOT HS 810 593.
- Neighbors, C., Vietor, N. A., & Knee, C. R. (2002). A motivational model of driving anger and aggression. *Personality and Social Psychology Bulletin*, *28*, 324–335.
- Parker, D., Lajunen, T., & Stradling, S. (1998). Attitudinal predictors of interpersonally aggressive violations on the road. *Transportation Research Part F: Traffic Psychology and Behaviour*, *1*, 11–24.
- Parker, D., Lajunen, T., & Summala, H. (2002). Anger and aggression among drivers in three European countries. *Accident Analysis and Prevention*, *34*, 229–235.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Rosenberg, M. (1979). *Conceiving the self*. New York: Basic.
- Rudolph, U., Roesch, S. C., Greitemeyer, T., & Weiner, B. (2004). A meta-analytic review of helping giving and aggression from an attributional perspective. *Cognition and Emotion*, *18*, 815–848.
- Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, *43*, 450–461.
- Smart, R. G., Mann, R. E., & Stoduto, G. (2003). The prevalence of road rage: Estimates from Ontario. *Canadian Journal of Public Health*, *94*, 247–250.
- Sobel, M. E. (1982). Asymptomatic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological methodology 1982* (pp. 290–312). Washington, DC: American Sociological Association.
- Underwood, G., Chapman, P., Wright, S., & Crundall, D. (1999). Anger while driving. *Transportation research Part F*, *2*, 55–68.
- Vallières, E. F., Bergeron, J., & Vallerand, R. J. (2005). The role of attributions and anger in aggressive driving behaviours. In G. Underwood (Ed.), *Traffic and transport psychology: Theory and research* (pp. 181–190). Oxford: Elsevier.
- Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.
- Weiner, B. (1995). *Judgments of responsibility: A foundation for a theory of social conduct*. New York: Guilford.
- Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educational Psychology Review*, *12*, 1–14.
- Weiner, B. (2006). *Social motivation, justice, and the moral emotions*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Wells-Parker, E., Ceminsky, J., Hallberg, V., Snow, R.-W., Dunaway, G., Guiling, S., et al. (2002). An exploratory study of the relationship between road rage and crash experience in a representative sample of US drivers. *Accident Analysis and Prevention*, *34*, 271–278.