

## THE ROLE OF DIFFICULTIES IN EMOTION REGULATION ON DRIVING BEHAVIOR

### *IMPACTO DE LAS DIFICULTADES EN LA REGULACIÓN EMOCIONAL SOBRE EL COMPORTAMIENTO DE LOS CONDUCTORES*

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#### Abstract

The present study tested associations among difficulties in emotion regulation and driving styles. One-hundred and thirty seven Argentinean drivers completed self-report measures of difficulties in emotion regulation and driving styles. As expected, greater difficulties in different types of emotion regulation abilities were related to anxious, angry, dissociative and risky driving. By contrast, lesser difficulties in regulating emotions were associated with careful driving. Stepwise multiple regression analysis revealed a differential contribution of specific types of emotion regulation abilities to each driving style. Importance of assessing emotional skills in candidates' examination to obtain/renewal driving license and emotion regulation based-interventions for drivers with maladaptive driving behaviors is emphasized. Limitations and future directions are also discussed.

**Keywords:** Difficulties in emotion regulation, driving styles, Traffic Psychology.

## Resumen

El objetivo del presente estudio consistió en evaluar la relación entre las dificultades en la regulación de las emociones y los estilos de conducción vehicular. Se aplicaron medidas de autoinforme a una muestra de 137 conductores argentinos que conducían vehículos regularmente. Conforme a las hipótesis que sustentaron este trabajo, se observó que aquellos conductores que presentaban mayores dificultades en diferentes dimensiones de regulación emocional presentaron un estilo de conducción más ansioso, agresivo, disociativo y riesgoso. Por el contrario, los conductores con menores dificultades para regular sus emociones evidenciaron un estilo de conducción más cordial y prudente. Por otra parte, análisis de regresión múltiple (método stepwise) revelaron que las dimensiones de regulación emocional realizaron una contribución diferencial en la predicción de los diferentes estilos de conducción. Se destaca la importancia de incluir en la evaluación no sólo las aptitudes psico-físicas sino también emocionales tanto en los aspirantes a la obtención como en la renovación del permiso de conducir y se ofrecen algunas propuestas para el desarrollo de programas de entrenamiento en regulación emocional para conductores con estilos de manejo desadaptativos. Finalmente, se exponen las limitaciones de este trabajo y se recomiendan futuras líneas de investigación.

*Palabras clave:* Dificultades en la regulación emocional, estilos de conducción, Psicología del Tránsito.

## Introduction

Traffic accidents constitute a global social and economic problem; around 1.24 million people die every year on the world's roads and another 20 to 50 million suffer nonfatal injuries due road traffic crashes. Road traffic injuries are currently the eighth leading cause of death around the world, the first cause of death for young people aged 15-29 years old and result in considerable financial costs, especially to developing economies. In this regard, the devastating effects of traffic crashes are concerned not only with global public health but also with sustainable development (World Health Organization [WHO], 2013).

Although certainly there are many factors that cause traffic crashes (see Haddon, 1980), it has been commonly acknowledged that human factor plays a more important role beyond other factors such as vehicle, road, etc (Rumar, 1990; United States General Accounting Office, 2003; Wang, 1995). Consequently, a particular interest has been shown to drivers' behaviors (AAA Foundation for Traffic Safety, 1997). Research in this domain has been primarily concerned in identifying variables which may influence accident involvement and risk-taking behavior in traffic (Ulleberg & Rundmo, 2003).

In this context, Elander, West and French (1993) argued that car accident liability is associated with

driving skill and driving style. Driving skill refers to the capability of drivers to maintain control over the vehicle and respond in an adaptively way to complex traffic situations. This skill is assumed to increase with practice or training. By style they referred to the ways drivers choose to drive or to their habitual driving mode, including features such as speed, headway, and trait levels of attentiveness and assertiveness, and is expected to be influenced by attitudes and beliefs regarding driving, as well as by more general needs and values.

In an effort to provide a conceptualization and measurement of a person's habitual driving style, Taubman-Ben-Ari, Mikulincer and Gillath (2004) distinguished among eight different driving styles in which individuals may usually engage in: (1) the dissociative driving style, which reflects the tendency to be distracted while driving and to commit driving errors due to this distraction; (2) the anxious driving style, which refers to the proneness to feel anxiety and distress during driving and to express lack of security about his or her driving skills; (3) the risky driving style, which relates to thrill seeking while driving, deliberate violation of safe driving norms and the tendency to engage in risky behaviors such as tailgate other drivers,

race with other cars, illegal passing, and so on; (4) the angry driving style, which consists of the tendency to feel irritable, angry and to behave aggressively towards other drivers, such as cursing or flashing lights; (5) the high-velocity driving style, which involves the tendency to drive fast and to express signs of time pressure during driving; (6) the distress-reduction driving style, which refers to the tendency to engage in relaxing activities during driving in order to reduce distress feelings, such as meditate; (7) the patient driving style, which reflects the tendency to be courteous and respectful towards other drivers, to feel no time pressure during driving, and to display calmness while driving; and (8) the careful driving style, which represents the tendency to be careful while driving including planning ahead, attention to road, and keeping the traffic rules. Further empirical researches (Poó, Taubman-Ben-Ari, Ledesma & Díaz-Lázaro, 2013; Taubman-Ben-Ari & Yehil, 2012) showed that were more appropriate to consider the risky and the high-velocity styles into a single driving style, namely, the risky style. In a similar vein, the patient and careful driving were merged together to represent the careful style. Accordingly, the construct of driving style was defined by six different dimensions that are, however, theoretically consistent with the broad domains originally proposed.

Accumulate research (Groeger & Rothengatter, 1998; Harré, 2000; Miller & Taubman-Ben-Ari, 2010; Poó et al., 2013; Taubman-Ben-Ari et al., 2004; Ulleberg & Rundmo 2003) indicates that there are a host of factors influencing on driving styles, including personality (e.g., sensation seeking, anxiety, aggression), cognitive (e.g., risk perception, self-efficacy), attitudinal (e.g., risk seeking), social (e.g., intergenerational transmission) and demographic variables (e.g., age and gender). With regard to the latter, it has been consistently demonstrated that women tend to exhibit more dissociative, anxious, and careful driving, while men tend to display higher risky and angry driving. Moreover, less adaptively driving styles (i.e., risky, dissociative, anxious and aggressive) were consistently found to diminish with age and, conversely, more adaptive ways of driving (i.e., careful) were positively associated with age.

Additionally, recent studies revealed the impact of emotions on drivers' attitudes and behaviors. For instance, anxiety was significantly associated with excitement-seeking and risky driving behavior (Oltedal & Rundmo, 2006). Moreover, driver rage was significantly related to speeding (Begg & Langley, 2004; Deffenbacher, Deffenbacher, Lynch & Richards, 2003). In addition, negative emotions while driving were associated with elevated risk perception, while positive ones were linked to lower risk perception (Hu, Xie & Li, 2013). Finally, Chan and Singhal (2013) demonstrated that emotions modulated drivers' attention reorienting away from task driving to emotional stimuli, resulting in decreased attention and information processing critical for driving performance. Clearly, these findings suggest that emotions can be detrimental for safe driving, being necessary to regulate them.

It is widely assumed that emotions are not irresistible forces that exert a sweeping influence on behavior. Rather, people can regulate their emotions and actually they engage in some form of emotion regulation almost all the time (Davidson, 1998). Emotion regulation refers to the different set of automatic and controlled processes through emotions are regulated (Gross & Thompson, 2007). These processes may target emotions at different points in the emotion-generative process, such as situation, attention, appraisal and emotions response components, and diminish, increase or maintain emotion, depending on an individual's goals.

An alternative model of emotion regulation based on emotional responses was developed by Gratz and Roemer (2004). According to this model, emotion regulation can be defined as a set of different, albeit interrelated, abilities including emotional awareness, emotional clarity, emotional acceptance, impulse control, ability to engage in desired goals while experiencing negative emotions and the ability to use flexibly and situationally appropriate strategies to modulate emotional responses as desired. The relative absence of any or all of these abilities would indicate the presence of difficulties in emotion regulation.

Emotion regulation is essential to effective human functioning (see Gross, 1998; Koole 2009, for

a comprehensive review). In addition, difficulties in emotion regulation are associated with poorer self-regulation leading to maladaptive behaviors such as substance abuse, binge eating and the tendency to risk taking (Cooper, Shaver & Collins, 1998; Haves, Wilson, Gifford, Follette, & Strosahl, 1996; Whiteside et al., 2007). Related to driving behavior, these findings could suggest that difficulties in emotion regulation may influence on maladaptive driving behaviors (e.g., aggressive, risky) and, conversely, the ability to regulate emotions may be involved in more adjusted driving behaviors (e.g., careful). In line with these assumptions, Feldman, Greeson, Renna and Robbins-Monteith (2011) found that difficulties in emotion regulation were associated with greater frequency of text-messaging while driving. By contrast, Arnau-Sabatés, Sala-Roca & Jariot-Garcia (2012) reported that emotion regulation abilities were negatively related to risky driving behaviors such speeding, taking alcohol and drugs, distraction and fatigue, and risk-taking tendency.

### *The current research*

According to previous review difficulties in emotion regulation appears to be related to risky driving. However, to our best knowledge no study has yet systematically and comprehensively explored the association between difficulties in emotion regulation and different driving styles. Thus, the goals of the current study were to: 1) examine the relationships between difficulties in emotion regulation and driving styles; 2) ascertain the difficulties in emotion regulation abilities that better predict each driving style.

Based on both theoretical assumptions and prior research, we hypothesized that higher difficulties in emotion regulation are positively and significantly related to risky, angry, dissociative and anxious driving. In opposition, we hypothesized that lower difficulties in regulating emotions are positively associated to distress reduction and careful driving.

### *Method*

#### *Participants*

A total of 137 participants recruited from Cordoba, Argentine, took part in this study. The sam-

ple consisted of 80 men and 57 women ranging from 18 to 65 years old ( $M = 36.82$ ;  $SD = 12.57$ ). The majority of participants were employees (88.2%). Three inclusion criteria were considered: (1) participants had to be eighteen years old or over, (2) to have had driver's license and (3) to drive regularly for at least a year. All participants agreed voluntarily to complete the measures and no reward was offered for participation in the study.

#### *Materials and instruments*

Difficulties in emotion regulation were assessed with the Argentine version of the Difficulties in Emotion Regulation Scale, DERS (Medrano & Trógo, in press). The original DERS (Gratz & Roemer, 2004) is a 36-items, self-report measure that assesses difficulties in different abilities involved in regulating emotions: lack of emotional awareness (6 items), lack of emotional clarity (5 items), nonacceptance of emotional responses (6 items), difficulties engaging in goal-directed behavior (5 items), impulse control difficulties (6 items) and limited access to emotion regulation strategies (8 items). Participants are asked to indicate how often the items apply to themselves, using a five-point Likert scale, from 1 ("almost never") to 5 ("almost always"). Exploratory factor analysis in Argentine population yielded six underlying factors that explained 50.79% of the total variance. Complementary studies using confirmatory factor analysis (Medrano & Trógo, 2012) demonstrated that six-factor model had better fit to the data ( $\chi^2_{dif} = 84.7$ ,  $p < .001$ ;  $\Delta CFI = .04$ ;  $\Delta GFI = .04$ ;  $\Delta RMSEA = .01$ ) than alternative five-factor model proposed by Hervás and Jódar (2008). Internal consistency showed good reliability for all subscales with alpha coefficients ranging from .70 to .87, except for limited access to emotion regulation strategies (Cronbach's alpha = .54). Lastly, correlations theoretically consistent of several DERS subscales and neuroticism and extraversion traits provided evidence for concurrent validity.

Driving styles were measured with the Multidimensional Driving Style Inventory Spanish-language version, MDSI-S (Poó et al., 2013). The MDSI-S is a 40-items self-report measure that evaluates six different types of driving behaviors

in which people usually engage in: risky style (9 items), dissociative style (10 items), angry style (6 items), careful style (6 items), anxious style (4 items) and distress reduction style (5 items). Participants were asked to read each item and to rate the extent to which it reflected their feelings, thoughts, and behaviors during driving on a 6-point Likert scale, ranging from 1 ("not at all") to 6 ("very much"). Exploratory analysis revealed that MDSI-S factors were clearly interpretable and explained 46.9% of the total variance. Correlations between driving styles and different measures of personality traits, self-reported traffic crash and offenses provided external validity of the MDSI-S. With regard to reliability, all MDSI-S subscales reported good internal consistency (alpha values higher than .70) and participants responses under different conditions (i.e., anonymous, non-anonymous, face-to-face and self-administered) did not show significant differences in MDSI-S scores, indicating the robustness of the MDSI-S against possible effects due social desirability bias.

#### Procedure

A paper version of the questionnaires was administered in this study. All participants agreed to participate voluntarily and clearly information about purposes of the study were provided before obtain consent. Finally, responses were analyzed using Statistical Package for Social Sciences 17.0.

#### Results

Means, standard deviations and correlations among variables are presented in Table 1. As seen in the table, we found positive correlations among all DERS subscales and angry driving, except for lack of emotional awareness. Both dissociative and anxious driving also positively correlated with almost all DERS subscales; the only exception was impulse control difficulties. In the same way, several positive correlations were found between impulse control difficulties, non acceptance of emotional responses, difficulties engaging in goal-directed behavior and risky driving. On the other hand, careful driving was negatively related with lack of emotional aware-

ness and lack of emotional clarity, while distress reduction driving did not show any significant relationship with DERS subscales. Finally, age negatively correlated with risky, dissociative and angry driving.

In order to analyze potential gender differences, a one-way MANOVA was performed. Results indicated a significant main effect of gender; multivariate  $F(12, 133) = 2.00; p = .005; \eta^2 = .16$ . More specifically, univariate analysis revealed gender main effect in risky ( $F(1, 133) = 6.29, p = .002, \eta^2 = .09; Ms = 22.62$  and  $17.40$  for males and females, respectively), anxious ( $F(1, 133) = 3.57, p = .031, \eta^2 = .05; Ms = 8.08$  and  $9.43$  for males and females, respectively) and distress reduction styles ( $F(1, 133) = 10.12; p = .000, \eta^2 = .13; Ms = 15.53$  and  $13.16$  for males and females, respectively).

To examine most relevant predictors of different driving styles, we conducted several stepwise multiple regression analysis with DERS subscales as predictors and driving styles as dependent variables. We chose this method because the present study had an exploratory goal. Therefore, stepwise multiple regressions allow the exclusion of redundant variables and the preservation of all significant variables (Cohen, Cohen, West & Aiken, 2003). Considering that correlation and MANOVA analysis showed a significant influence of age and gender on various driving styles, these variables were introduced in first step as covariates. A model was created for each dependent variable (Table 2). Results showed that impulse control difficulties ( $\beta = .49; p < .001$ ) and limited access to emotion regulation strategies ( $\beta = .23; p < .05$ ) predicted risky driving. In addition, nonacceptance of emotional responses ( $\beta = .28; p < .01$ ), difficulties engaging in goal-directed behavior ( $\beta = .21; p < .05$ ) and lack of emotional awareness ( $\beta = .19; p < .05$ ) predicted dissociative driving. On the other hand, lack of emotional awareness ( $\beta = .27; p < .01$ ) and nonacceptance of emotional responses ( $\beta = .26; p < .05$ ) were involved in the prediction of anxious driving, while impulse control difficulties ( $\beta = .41; p < .001$ ) was involved in the prediction of aggressive driving. Finally, lack of emotional awareness ( $\beta = -.29; p < .01$ ) negatively predicted careful driving.

**Table 1.**  
*Descriptive statistics and correlations among variables*

		<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Impulse control difficulties		12.31	5.65	-												
2. Limited access to emotion regulation strategies		19.27	6.46	.63**	-											
3. Nonnaceptance of emotional responses		13.52	5.93	.48**	.61**	-										
4. Difficulties engaging in goal-directed behavior		13.25	4.56	.57**	.56**	.40**	-									
5. Lack of emotional awareness		22.00	4.70	.26**	.14	.12	.09	-								
6. Lack of emotional clarity		10.01	3.70	.41**	.44**	.36**	.33**	.25**	-							
7. Risky style		20.41	9.35	.38**	.10	.20*	.17*	.01	.12	-						
8. Dissociative style		22.78	6.86	.13	.25**	.29**	.32**	.22**	.31**	.24**	-					
9. Careful style		28.86	4.77	-.11	-.12	-.07	-.14	-.30**	-.24**	-.35**	-.32**	-				
10. Anxious style		8.60	3.42	.12	.22**	.26**	.20*	.22**	.20*	.11	.55**	-.09	-			
11. Distress reduction style		14.57	3.2	.11	-.05	-.02	.07	.07	.00	.42**	.05	.02	-.07	-		
12. Angry style		17.05	5.82	.41**	.22**	.26**	.27**	-.02	.22**	.69**	.25**	-.40**	.11	.31**	-	
13. Age		36.82	12.57	.02	.05	.17*	-.15	.12	.01	-.21*	-.25**	.13	-.12	-.01	-.18*	-

\*\*p<.01  
 \*p<.05

**Table 2.**  
*Summary of regression models*

Dependent variable: risky style						
	R <sup>2</sup>	Δ R <sup>2</sup>	F	p	β	p
Step 1	.138	.138	10.60	.000		
Gender					-.30	.000
Age					-.23	.004
Step 2	.307	.169	5.17	.000		
Impulse control difficulties					.49	.000
Age					-.26	.001
Gender					-.24	.002
Limited access to emotion regulation					.23	.019
Strategies						
Dependent variable: dissociative style						
	R <sup>2</sup>	Δ R <sup>2</sup>	F	p	β	p
Step 1	.067	.067	4.80	.010		
Age					-.24	.004
Step 2	.293	.226	6.76	.000		
Nonacceptance of emotional responses					.28	.004
Age					-.24	.003
Interference in goal-directed behavior					.21	.033
Lack of emotional awareness					.19	.028
Dependent variable: anxious style						
	R <sup>2</sup>	Δ R <sup>2</sup>	F	p	β	p
Step 2	.185	.161	4.19	.001		
Lack of emotional awareness					.27	.004
Nonacceptance of emotional responses					.26	.015
Note: age and gender covariates introduced in first step were not statistically significant (p>.05)						
Dependent variable: angry style						
	R <sup>2</sup>	Δ R <sup>2</sup>	F	p	β	p
Step 1	.061	.061	4.31	.015	-.19	.025
Age	.250	.189	5.32	.000	-.17	.046
Gender					.41	.000
Step 2					-.20	.012
Impulse control difficulties						
Age						
Dependent variable: careful style						
	R <sup>2</sup>	Δ R <sup>2</sup>	F	p	β	p
Step2	.152	.129	3.21	.006	-.29	.002
Lack of Emotional awareness						
Note: age and gender covariates introduced in first step were not statistically significant (p>.05)						

## Discussion

The aim of the present study was to analyze the relationship between difficulties in emotion regulation and driving styles. In general, results support the assumption that difficulties in emotion regulation are significantly related to different driving behaviors. The only exception was distress reduction driving style, which did not display significant relationships with any of the emotion regulation abilities. More specifically, finding indicates that higher difficulties in different emotion regulation abilities were positively and significantly related to anxious, dissociative, risky and angry driving. In contrast, lower difficulties in emotion regulation were associated with more adaptive, careful driving. Multiple regression analysis showed a differential contribution of specific emotion regulation abilities in the prediction of driving styles. Particularly, risky style was better predicted by impulse control difficulties and limited access to emotion regulation strategies. Dissociative style was significantly predicted by non acceptance of emotional responses, difficulties engaging in goal-directed behavior and lack of emotional awareness. In addition, anxious style was mainly predicted by lack of emotional awareness and non acceptance of emotional responses. Moreover, angry style was uniquely predicted by impulse control difficulties. Finally, careful driving was negatively predicted by lack of emotional awareness.

In accordance with previous literature (Arnau-Sabatés et al., 2012; Feldman et al., 2011), the present results highlight the role of emotion regulation abilities on drivers' behavior. However, prior studies solely focused in influences of emotion regulation on risky driving behaviors. In these sense, the current research goes a step forward by extending the scope to include the relations between emotion regulation abilities and various driving styles.

From a practical perspective, the present results suggest that a relevant issue to consider when assessing candidates to obtain/renew driving license may be to include not only physical and psychological examination but also emotional skills. Moreover, according to both correlational

and multiple regression analysis, interventions aimed to increase emotion regulation abilities may be potentially useful in decreasing maladjusted driving behaviors such as risky, aggressive, dissociative and anxious driving styles. It is important to note, however, that the influence of emotion regulation on driving styles was assessed through an ex post facto approach (Montero & León, 2007). Therefore, we cannot discard potential confounding variables and, hence, causality effects cannot be confirmed. Yet, findings from multiple regression analysis showed that difficulties in emotion regulation accounted for 16-20% of the variance in maladaptive driving styles, above and beyond demographic variables. In light of these results, it would be valuable for further research to examine using a more rigorous experimental design the efficacy of emotion regulation based-interventions with maladaptive drivers. Such approach could provide strong evidence about direct causal effect of emotion regulation on driving behavior and support applied interventions.

Indeed, some experimental studies (e.g., Deffenbacher, Huff, Lynch, Oetting & Salvatore, 2000; see also Deffenbacher, 2009) revealed that emotion regulation programs based on physical and cognitive relaxation strategies reduced road rage, aggressive expression of anger and risk behaviors in angry drivers. Nonetheless, the results of current research suggest that it may also be worthwhile to evaluate the efficacy of distinct emotion regulation abilities (e.g. impulse control, emotional acceptance and emotional awareness) in different maladaptive driving behaviors. By way of example, it would be interesting to assess whether intervention strategies aimed to increase emotional awareness (e.g., mindfulness) and emotional acceptance (e.g., acceptance-based interventions) are helpful in reducing feelings of anxiety and distress experienced by dissociative and anxious drivers.

Notwithstanding the implications listed above, the current study has several limitations. First, a small sample of participants was recruited using a convenience sampling. In this sense, although we have included people of different gender, ages and driving experience, it remains necessary to replicate this study using a more representative sample from general popula-

tion in order to examine more rigorously the findings herein.

Second, data was collected via self-report measures and thus responses may suffer from social desirability and other self-serving biases. However, it should be noted that recent studies comparing self-reports and actual driving found them to be strongly correlated (e.g., Boufous et al., 2010). Another studies found driving-related self-reports to be robust against social desirability (Poó et al., 2013; Sullman & Taylor, 2010). Still, naturalistic driving studies could bring about how people deal with emotions (e.g., angry, excitement) triggered in different traffic situations and their correlates on attitudes and driving behaviors in real scenarios.

Third, DERS measure used in this study concerns primarily to difficulties in the regulation of negative emotions (Gratz & Roemer, 2004). Prior research revealed that positive emotions while driving were significantly associated with faster mean speed (Chan & Singhal, 2013) as well as sensation seeking, lower subjective risk evaluation and more number of crashes (Mesken, Hagenzieker, Rothengatter & de Waard 2007). Thus, it seems vital for further research to assess drivers' regulation of positive emotions as well.

### Conclusion

The present study offers a comprehensive understanding of the relationship between the abilities to regulate emotions and drivers' behavior. Although findings underscore the importance of including emotional skills when assessing driver candidates and suggest potentially useful routes for intervention that could contribute to decrease unsafe driving, their must be regarded as preliminary in light of limitations. Future investigations are necessary to examine the robustness of the findings herein.

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