

## RESILIENCE, AGGRESSION AND RISK-TAKING BEHAVIOR AMONG ROMANIAN RACING DRIVERS – A PRELIMINARY STUDY

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**Abstract.** *In the literature one can find a few studies on race car drivers. The aim of the research was to highlight the resilience level, the aggression level and risk taking behavior among Romanian race car drivers. 30 athletes participated in the study, rally drivers, athletes practicing competitive hill climb racing, drifting and circuit racing. The Brief Resilience Scale, The Romanian adaptation of the Makarowski's Stimulating and Instrumental Risk Questionnaire and The Romanian adaptation of the Makarowski's Aggression Questionnaire were used. After applying the Kruskal-Wallis H test, no significant differences were emphasized between sports disciplines (circuit, drift, rally and hill climbing), in terms of the psychological variables examined. However, when athletes were investigated according to age and taking into account the reported ability to concentrate and relax before competitions, significant differences were observed. Race car drivers (in the entire sample) over 18 years old registered a higher score for Foul play and Assertiveness, while athletes who reported a moderate level of concentration during competitions and, also, who declared that are less relaxed before contests, obtained higher values for Foul play. The findings provide valuable data regarding the resilience level, aggression and risk-taking behavior of race car drivers, according to age, sports discipline, perceived level of relaxation and concentration, which can guide specialists in the training process.*

**Keywords:** *race car drivers; resilience; aggression; risk-taking behavior.*

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### Introduction

It is commonly believed that personality traits play a decisive role, influencing drivers' behaviors. Indeed, it seems that emotional stability and openness to experience predict dangerous driving behaviors (Dahlen & White, 2006). Also, personality factors such as agreeableness, neuroticism, conscientiousness have a strong impact (Jovanović et al., 2011), neuroticism being the most important feature leading to risky and negative driving behaviors (Zhang et al., 2021; Shen et al., 2018), which can result in injuries. A person with high

neuroticism is more impulsive, gets angry more easily, experiencing more negative affects (Widiger & Oltmanns, 2017).

Aggressive behaviors accompany athletic activity, aggression being a personality characteristic which indicates the influence of people's affective states on social environment (Cynarski et al., 2015). With respect to aggression, specialized literature discusses about verbal aggression, physical aggression, hostility and anger (Buss & Perry, 1992), about instrumental and hostile aggression (Silva, 1983), or about explicit and implicit aggression (Predoiu et al., 2022). In the present research we explored the three factors of aggression according to Ryszard Makarowski's model: foul play, assertiveness and go-ahead (Makarowski et al., 2021a).

Aggressive behavior in sport can be intensified by coaches, peers, sport commentators, fans or media owners, researchers highlighting a trend towards greater aggression, even in sports branches without direct contact with the opponent (Klimczak et al., 2014).

Some athletes are more prone to risk than others, being characterized by lower conscientiousness and higher values for extraversion and neuroticism (Kajtna et al., 2004). Risk-taking can have two motivations: achieving an important goal (instrumental risk) or experiencing a pleasurable physiological activation (stimulating risk). Instrumental risk takers show analytical and rational thinking (Zaleśkiewicz, 2001), focusing on possible losses, having strategies to achieve the set goals. In the case of stimulating risk, it is impulsive, the emotional system of information processing dominates, it is the mere participation in the risky situation that counts and the desire to experience intense emotions (Makarowski & Piotrowski, 2017). Researchers found that in sports, teams and athletes who are about to be defeated in a competition take riskier decisions (Grund et al., 2013; Grund & Gürtler, 2005).

The fact that athletes typically strive for uncertain outcomes that are personally meaningful may explain that they may experience intense positive as well as negative emotional reactions during a competition (Jekauc et al., 2021). Moreover, research suggests that particular in individual sports negative events may stronger influence one's emotional state than positive ones (Fritsch et al., 2022a; Fritsch et al., 2023). At the same time, however, in line with appraisal emotion approaches (e.g., Lazarus, 1991; Scherer, 2013), it is not the situation per se that determines one's emotional reaction but rather how the situation is psychologically appraised by the individual. For example, the same situation (e.g., competing against an opponent who is lower ranked than you) may either evoke a sense of control or a sense of pressure leading to different kinds of emotional states (Fritsch et al., 2022b). This consideration points also to interindividual differences in athlete's tendency to deal with psychologically challenging situations. Here, resilience has been advocated as a psychological construct that may help individuals to adapt to a situation that may exhibit adversity (Luthar et al., 2000). Resilience can be defined as "the role of mental processes and behaviour in promoting personal assets and protecting an individual from the potential negative effect of stressors" (Fletcher & Sarkar, 2013). Individuals who have a high level of resilience may therefore be better able to deal with obstacles, setbacks, and failure that come with sports competition. Persons with high resiliency are able to better tolerate risks and experience lower levels of anxiety (McCleskey & Gruda, 2021). Indeed, there is a burgeoning literature showing the relevance of resilience in the sports context (Bryan et al., 2019; Galli & Gonzalez, 2015; Sarkar & Fletcher, 2014).

In a recent study, Rawat et al. (2023) found that athletes as BMW drivers have higher values for neuroticism (than athletes driving other car brands), but, in the same time, they showed higher resiliency, the greatest difference being emphasized in the case of tolerance of failures and perceiving life as a challenge subscale.

In the literature, a few studies on race car drivers can be found, drivers (as athletes) being less investigated (Potkanowicz & Mendel, 2013). As mentioned authors underlined – “with the high-priced world of motorsports being driven by technology and engineering, drivers are subjected to greater physiological stress than ever before. Therefore, to not examine the driver [...] is to ignore a significant part of the total system.” Among the stressors experienced by race car drivers are increased heart rate and body temperature, muscular effort and G-forces (Baur et al., 2006). For example, when experiencing positive Gz forces (head-to-toe), it becomes difficult to breathe, the organism has difficulties to pump blood to the brain (Voshell, 2004), and the eyes start having trouble - peripheral vision begins to fade (Whinnery & Shender, 1993).

Researchers indicated (consistently) the insufficiency of the studies conducted in the field of racing drivers (Potkanowicz et al., 2021). The studies carried out so far include (for example) thermal challenges in race car drivers (Potkanowicz, 2015), athletes' heart rate responses (Beaune & Durand, 2011), or the psychophysiological dynamics of racing drivers (Filho et al., 2015).

## Methodology

### *Scope*

The aim of the research was to highlight the resilience level, the aggression level and risk-taking behavior among race car drivers, according to age and sports disciplines practiced.

### *Research questions*

- 1) What are the differences among race car drivers according to the sports disciplines practiced (circuit, drift, rally and hill climbing), in terms of resilience, aggression and risk-taking behavior?
- 2) What are the differences among race car drivers according to age, in terms of resilience, aggression and risk-taking behavior?
- 3) What are the differences between athletes who reported a higher ability to concentrate during competitions, a higher capacity to relax before competitions and racing drivers who reported lower values, in terms of the psychological variables investigated?
- 4) What are the links between aggression, instrumental risk, stimulating risk and resilience in the case of race car drivers?

### *Participants*

A total number of 30 race car drivers from Romania (25 males and 5 female athletes),  $M_{age} = 19.76$ , participated in the research. The race car drivers are distributed as follows (according to the sports disciplines practiced): Drifting (N = 9), Circuit (N = 13), Hill climb racing and

Rally drivers ( $N = 8$ ). 11 participants have over 18 years old ( $M_{age} = 26.63$ ), and 19 athletes are aged 16-18 years old ( $M_{age} = 16.57$ ).

### *Instruments*

The Brief Resilience Scale was created by Smith et al. (2008), being a six-item 5-point Likert-type scale (three items are reverse scored), where 1 - “strongly disagree” and 5 - “strongly agree”. Item example: "I have difficulty in overcoming stressful events." The reliability coefficient (Cronbach’s alfa) of the scale, for the present research, is 0.82.

The Romanian adaptation of the Makarowski's Stimulating and Instrumental Risk Questionnaire (Makarowski et al., 2021b) was used to explore instrumental risk and stimulating risk, being an eight-item scale. Points were distributed according to participants' answers, as follows: “true” – 5 points; “untrue” – 1 point, “rather true” – 4 points; “rather untrue” – 2 points, respectively “hard to say” – 3 points. The reliability coefficients (Cronbach’s alfa) in the current study were 0.76 (instrumental risk) and 0.78 for stimulating risk.

The Romanian adaptation of the Makarowski's Aggression Questionnaire (Makarowski et al., 2021a) was used to assess the level of manifestation of three factors of aggression: Go-Ahead (the perseverance in reaching the goals regardless of the costs/ obstacles encountered); Foul Play (involves unfair play, blocking of others’ tasks in an unethical manner) and Assertiveness (the ability to voice criticism without hurting others, the ability to compete respecting the boundaries of the game). The athletes responded using a 5-point Likert-type scale, from “a” Definitely not (1 point) to “e” which denotes Definitely yes (5 points). The Cronbach’s alfa values for the present research were 0.72 (go-ahead), 0.81 (foul-play), respectively 0.78 (assertiveness), an adequate (and good) reliability (Acock, 2008).

Athletes were also asked to respond the following two questions: 1) What is your ability to concentrate during competitions? (on a scale of 1 to 10, where 1 = very weak and 10 = very good), and 2) How relaxed are you before competitions? (on a scale of 1 to 10, where 1 = not at all and 10 = strongly).

### *Procedure*

The questionnaires were applied online through Google Forms, in April-May 2023. Written informed consent to participate was obtained, confidentiality of results and anonymity of athletes was ensured, and were informed that they could withdraw from the study at any time (aspects related to compliance with ethical principles in research, Predoiu & Predoiu, 2022).

## **Results**

The mean values, at group level, for the psychological variables investigated, according to the sports discipline practiced (circuit, drift, rally and hill climbing) are presented in Table 1.

Table 1. Race car drivers – results according to the sports discipline practiced

	Sports discipline	RES	Go-A	FP	A	SR	IR
Mean	1 circuit	21.7	19.0	8.00	18.9	11.7	17.5
	2 rally and hill climbing	22.5	19.8	9.88	21.3	13.5	16.3
	3 drift	21.4	17.7	9.33	18.4	11.0	17.7
Std. error mean	1 circuit	0.593	0.768	0.892	0.888	0.843	0.418
	2 rally and hill climbing	0.964	0.959	0.666	0.773	0.732	1.01
	3 drift	0.626	1.01	0.986	1.46	1.39	0.745
Std. deviation	1 circuit	2.14	2.77	3.21	3.20	3.04	1.51
	2 rally and hill climbing	2.73	2.71	1.89	2.19	2.07	2.87
	3 drift	1.88	3.04	2.96	4.39	4.18	2.24

Note: RES: Resilience; Go-A: Go-Ahead factor of aggression; FP: Foul Play; A: Assertiveness; SR: Stimulating risk; IR: Instrumental risk.

Considering the questionnaires' norms, the results in Table 1 emphasize:

- A Moderate level for Go-ahead factor, a recommended score with respect to the Yerkes-Dodson law (Matthews et al., 2003) - a relatively moderate level of arousal being linked to better performances in difficult tasks;
- Moderate levels of resilience;
- A moderate to low score for Foul-play - rally drivers and race car drivers practicing hill climbing registered the highest values for this aggression factor ( $M = 9.88$ );
- Moderate to high scores for Assertiveness;
- A low level of stimulating risk (rally drivers and athletes practicing hill climbing registered the highest scores –  $M = 13.5$ ) and a high level of instrumental risk.

Table 2. Kruskal-Wallis H test results according to the sports discipline practiced

	$\chi^2$	df	p	$\varepsilon^2$
Resilience	1.39	2	0.498	0.0480
Go-Ahead	2.73	2	0.255	0.0941
Foul play	3.30	2	0.192	0.1139
Assertiveness	3.24	2	0.198	0.1119
Stimulating risk	2.49	2	0.287	0.0860
Instrumental risk	1.26	2	0.532	0.0435

Note:  $\varepsilon^2$  - epsilon squared (effect size)

There were no significant differences between athletes according to the sports discipline practiced: circuit, drift, rally and hill climbing (Table 2,  $p > 0.05$ ).

Table 3. Mann-Whitney U results according to age (regardless of the sports discipline practiced)

		Statistic	p
Resilience	Mann-Whitney U	85.5	0.417
Go-Ahead	Mann-Whitney U	73.5	0.182
Foul play	Mann-Whitney U	55.5	0.035
Assertiveness	Mann-Whitney U	49.5	0.018
Stimulating risk	Mann-Whitney U	91.5	0.587
Instrumental risk	Mann-Whitney U	98.0	0.793

Race car drivers (in the entire sample) over 18 years old registered a significantly higher score for Foul play and Assertiveness, compared to racing drivers between 16-18 years old. The effect size index  $r = 0.43$  (assertiveness) and  $r = 0.38$  (foul play), highlighting a moderate to strong difference between the two groups.

Table 4. Kruskal-Wallis H test results according to the reported ability to concentrate during competitions

	$\chi^2$	df	p	$\epsilon^2$
Resilience	1.29	2	0.524	0.0462
Go-Ahead	2.60	2	0.273	0.0928
Foul play	5.05	2	0.080	0.1803
Assertiveness	2.87	2	0.238	0.1025
Stimulating risk	2.27	2	0.321	0.0812
Instrumental risk	1.37	2	0.505	0.0488

Even if the differences are not statistically significant (Table 4,  $p > 0.05$ ), athletes who reported a moderate level of concentration during competitions ( $n = 8$ ) obtained higher values for Foul play (unfair play):  $M_{Foul\ Play} = 9.88$ ,  $SD = 1.89$ , compared to athletes who reported a higher ability to concentrate - choosing values 9 and 10 ( $n = 10$ ,  $M_{Foul\ Play} = 7.58$ ,  $SD = 2.97$ ) and compared, also, to racing drivers who reported a lower ability to concentrate during contests - choosing values between 2 and 7 ( $n = 12$ ,  $M_{Foul\ Play} = 9.33$ ,  $SD = 2.96$ ).

Table 5. Mann-Whitney U test results according to the reported ability to relax before competitions

		Statistic	p
Resilience	Mann-Whitney U	71.0	0.843
Go-Ahead	Mann-Whitney U	70.0	0.799
Foul play	Mann-Whitney U	36.5	0.033
Assertiveness	Mann-Whitney U	62.5	0.502

		Statistic	p
Stimulating risk	Mann-Whitney U	74.0	0.978
Instrumental risk	Mann-Whitney U	70.5	0.822

Race car drivers who declared that are less relaxed before competitions (choosing values between 3 and 7,  $n = 20$ ) obtained significantly higher values for Foul play (“dirty” play):  $p = 0.033$ ,  $M_{Foul\ Play} = 10.5$ ,  $SD = 2.23$ , compared to athletes ( $n = 10$ ) who declared that are more relaxed before contests, with values between 8 and 10 ( $M_{Foul\ Play} = 8.30$ ,  $SD = 2.50$ ).

Further, the links between aggression, instrumental risk, stimulating risk and resilience among professional race car drivers were checked.

Table 6. Correlation matrix between the psychological variables explored ( $n = 30$ )

		RES	Go-A	FP	A	SR	IR
RES	Pearson's r	—					
	p-value	—					
Go-A	Pearson's r	0.291	—				
	p-value	0.119	—				
FP	Pearson's r	0.085	0.061	—			
	p-value	0.656	0.751	—			
A	Pearson's r	-0.122	0.290	0.039	—		
	p-value	0.521	0.120	0.839	—		
SR	Pearson's r	0.312	0.454	0.088	-0.133	—	
	p-value	0.094	0.012	0.644	0.484	—	
IR	Pearson's r	0.255	-0.128	0.054	-0.140	-0.112	—
	p-value	0.175	0.502	0.779	0.460	0.557	—

Note: RES: Resilience; Go-A: Go-Ahead factor of aggression; FP: Foul Play; A: Assertiveness; SR: Stimulating risk; IR: Instrumental risk.

A positive significant association was found between stimulating risk and go-ahead ( $r = 0.454$ ,  $p = 0.012$ ). The effect size index  $r^2 = 0.20$ , meaning a moderate to strong correlation between variables (Predoiu, 2020). As athletes aim to overcome the obstacles encountered, perseveres in achieving their goals, they have a greater need to take risks without rational analysis of the situations (emotional processes dominating athletes' decisions). It is worth mentioning that in the case of the Go-ahead factor of aggression (the perseverance in reaching the goals) a moderate score was obtained (at group level), while in the case of stimulating risk this value is low.

## **Discussions and Conclusion**

The current research addresses a gap in the literature considering the resilience level, aggression level and risk-taking behavior (instrumental and stimulating risk) of race car drivers. Racing drivers obtained a moderate level of resilience - a moderate capacity to bounce back after a challenge, or difficulty. Being resilient may help better tolerate negative affective states and facilitate effective functioning in challenging circumstances (Oginska-Bulik & Juczynski, 2008).

In the case of the Go-ahead factor of aggression, a moderate score was emphasized, a value which we consider appropriate taking into account the inverted U relationship between cortical arousal and performance (Matthews et al., 2003).

With respect to Foul play factor, a moderate to low score was observed (at group level), rally drivers and athletes practicing hill climbing having the highest values. Statistical analysis of the data revealed, also, a low level of stimulating risk (rally drivers and race car drivers practicing hill climbing registered the highest scores), a high level of instrumental risk (athletes are calculated and critically examines the possibility of failure, the rational processes dominate), and a moderate to high score for assertiveness.

When the sports discipline practiced were investigated (circuit vs. drift vs. rally and hill climbing), no significant differences were observed. However, athletes practicing rally and hill climbing obtained the highest scores for: resilience, go-ahead, foul play, assertiveness and stimulating risk, and the lowest value for instrumental risk.

Race car drivers (in the entire sample) over 18 years old registered a significantly higher score for Foul play and Assertiveness, compared to younger athletes (16-18 years old). In other words, athletes with a higher competitive experience are blocking others' activities (usually in an unethical manner), being, in the same time, more assertive (expressing their emotions directly, criticizing the behavior of others when they think they are right, but within appropriate boundaries, without harming them). Therefore, better manipulative skills can be observed in more experienced athletes (playing "dirty", while at the same time being assertive).

When the reported ability to concentrate during competitions was explored, racing drivers having a moderate level of concentration obtained higher values for Foul play (unfair play), than racing drivers who reported a higher ability and, also, a lower ability to concentrate during competitions. Not least, athletes who declared that are less relaxed before contests obtained higher values for Foul play ("dirty" play), compared to athletes who declared that are, generally, relaxed before competitions. In other words, these athletes (with an average level of concentration and less relaxed) may realise that they are more stressed and behind the others (at least in terms of their ability to concentrate in competition), thus being more motivated to take greater risks and do anything to win. Researchers found that more risks are performed by players trailing just behind the interim leaders (Genakos & Pagliero, 2012), when lagging (Yang & Zhao, 2023), or when they are ranked behind in a competition (Grund et al., 2013; Genakos & Pagliero, 2012). Also, it seems that in a race, drivers take a greater risk when outclassed by lower-ranked opponents (Bothner et al., 2007).

On the relationships between the investigated psychological variables, a positive correlation was found between stimulating risk and go-ahead factor of aggression. As racing drivers aim to overcome the obstacles encountered, they assume higher risks (the emotional processes



dominate). In sports, aggression mobilizes the psychophysical resources (Korobeynikov et al., 2019), being a manifestation of athlete's inner emotions (Maxwell, 2004).

The current study has some limitations, maybe the most important being the reduced number of racing drivers investigated, for each discipline: drifting, circuit, hill climb racing and rally. However, most of the studies carried out in the field (including those cited in the current paper) have investigated less than ten race car drivers. Also, the results may not be replicated in athletes from other countries. Then, different research must be conducted considering only young pilots or only expert/ professional racing drivers, and only race car drivers from a specific sport discipline.

The findings of the present study can guide specialists in the training process, being aware of the resilience level, aggression and risk-taking behavior of racing drivers according to age, sports discipline and, also, taking into account athletes' perceived level of concentration and relaxation before or during competitions.

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**Informed Consent Statement:** The written informed consent for the athletes to participate in the study was obtained.

**Data Availability Statement:** Data are available upon request to the contact author.

**Conflicts of Interest:** The authors declare no conflict of interest.

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