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Psychological Characteristics of Young Motocross (MX) Riders Based on Hungarian Championship Races †

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Abstract: Motocross (MX) requires physical and psychological fitness, so the performance of the individual is crucial to success. The aim of this study is to describe psychological characteristics measured under competitive conditions among successful adolescent MX riders. Methods: Eight young Hungarian MX riders were analyzed using the Individual Zones of Optimal Functioning (IZOF) model. Results: The pleasure component was lower, while tension and stressors were almost always greater after the race than before, regardless of the result achieved. Conclusion: Further research is needed to ensure the outstanding performance of riders combined with high-quality technical training and psychological preparation.

Keywords: motocross performance; psychological characteristics; young MX riders; cognitive anxiety state

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1. Introduction

Motocross (MX) is an off-road race where the rider's performance is determined by the combined effects of the rider's motocross skills, motorcycle, and the environment [1,2]. It takes place on natural, pre-designated terrain where the uneven ground (holes, gullies, and ups and downs) presents a challenge to riders. According to Gobi et al. [3], MX is a competition of high speed on a rough 2 km course on natural terrain that allows riders to perform jumps 20 m in length and 5 m in height, on dirt, mud, sharp turns, and steep slopes. The race consists of two "clashes" with a short break between them. Motocross demands physical and mental fitness from the athlete, so the performance of the individual is crucial for success [4,5]. MX requires the use of whole-body musculature in aerobic and anaerobic energy systems, the skills needed to control a motorcycle on a challenging course [2,6,7], as well as high-level mental concentration.

Contemporary views on emotions, in general, and psychology emphasize the role of emotions in adaptation. Emotions are thought to habituate cognitive abilities to successfully perform in certain situations, improve decision-making, prepare motor responses, facilitate learning, provide information about intentions, and regulate social behavior [8]. Racing can trigger emotions of opposite tone, such as the elation and satisfaction of victory or the despair and disappointment of defeat. In turn, emotions can be beneficial or detrimental to performance during training and competition [9]. The aim of the present study is to describe the characteristics of adolescent boys' MX riders, internationally ranked, related to affective distress (enjoyment, tension, control, and stressors before and after the competition).

2. Material and Methods

Eight Hungarian young elite motocross riders volunteered for this study. The research was carried out as a complementary part of a more complex anthropometric and physiolog-

ical cross-sectional study that took place on racing court sites and laboratory locations in 2021. A seven-question psychological questionnaire was formulated on current cognitive anxiety about racing using the Individual Zones of Optimal Functioning (IZOF) model [10]. Three questions were asked before the race and four shortly after the race (Figure 1). The answers to the questions were marked on a scale of 10. The questionnaire was uploaded to the contestants' smartphones, which they used to answer the questionnaire. The model attempts to incorporate bio-psychosocial states related to performance in a holistic approach, in which emotional experience is understood as a crucial component. The IZOF model provides a comprehensive conceptual framework for describing and predicting subjective optimal and dysfunctional experiences of successful and poor individual performance [11].

A	U<E		U>E		U=E		Z	p
	persons	%	persons	%	persons	%		
enjoyment	5	**62.5**	2	25.0	1	12.5	−1.018	0.309
tension	1	12.5	6	**75.0**	1	12.5	**−2.136**	**0.033**
control	2	25	5	**62.5**	1	12.5	−0.017	0.865

B	U<E		U>E		U=E		Z	p
	persons	%	persons	%	persons	%		
enjoyment	2	25.0	6	**75.0**	0	0.0	**−2.116**	**0.034**
tension	4	**50.0**	2	25.0	2	25.0	−0.949	0.343
control	6	**85.7**	1	14.3	0	0.0	−1.811	0.07

Figure 1. Free practice (**A**) and timed practice (**B**)—before and after enjoyment, tension, and control (pooled sample, non-parametric test, Wilcoxon test). Abbreviations: (U < E) = before free practice; (U > E) = after free practice; (U = E) = before free practice, after free practice.

All participants, are certified members of the Hungarian Motorsport Association, received detailed information about the purpose of the study, potential risks, measurement methods and motor test techniques, which they could practice in training sessions immediately before the study. They gave their voluntary consent to participation; parents signed a consent declaration. Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., released 2017, Armonk, NY: IBM Corp.). Research was conducted by the guidelines and directives of the Health Science Council, Scientific and Research Ethics Committee (IV/3067-3/2021/ECU), and the Declaration of Helsinki.

The Questionnaire

Seven questions were asked, the first three questions before and after the race. Q1. How much do you enjoy the current situation? Q2. How stressed are you in the current situation? Q3. How much control do you feel you have over the situation? And the fourth question after the trials. Q4. Overall, how stressful did you feel the situation was?

3. Results

The Results of the Psychological Questionnaire on the Current State of Affective Distress Related to Racing, Carried Out on the Day of the Race

During the free training (Figure 1A), a significantly higher proportion of the voltage was marked after (U > E = 75.0%), (Z = −2.136), $p < 0.033$, than before. The values of enjoyment and control before and after were not significant. Enjoyment was rated higher before (U < E = 62.6%) than after (U > E = 25.0%). As for control, it was rated higher after than before (U > E = 62.5%). Time trial training (Figure 1B) showed a significantly higher proportion of enjoyment after than before (U > E = 75.0%), (Z = −2.116), $p < 0.034$. Tension and control before and after time trial training showed no significant difference. Tension

was more prevalent before than after (U < E = 50.0), while control was more prevalent before than after (U < E = 85.7).

In the first race (Figure 2A), no significant differences were found in any of the psychological items tested. Pleasure was more prevalent before than after (U < E = 71.4%), while tension was more prevalent after than before (U > E = 71.4%). As for the control trait, it was more prevalent after than before (U > E = 57.1%). In the second run (Figure 2B), no real difference was found in either item before or after. Enjoyment was rated as greater in the same proportion either before or after, while tension was rated as greater in the same proportion either before or after, or unchanged. Control is rated more before than after (U < E = 60.0%).

A	U<E		U>E		U=E		Z	p
	persons	%	persons	%	persons	%		
enjoyment	5	**71.4**	1	14.3	1	14.3	−1.687	0.092
tension	2	28.6	5	**71.4**	0	0.0	−1.886	0.062
control	1	14.3	4	**57.1**	2	28.6	−1.089	0.276

B	U<E		U>E		U=E		Z	p
	persons	%	persons	%	persons	%		
enjoyment	2	**40.0**	2	**40.0**	1	20.0	−0.184	0.854
tension	1	20.0	2	**40.0**	2	**40.0**	−1.089	0.276
control	3	**60.0**	2	40.0	0	0.0	−0.966	0.334

Figure 2. Race 1—before and after enjoyment, tension, and control (**A**); Race 2—before and after enjoyment, tension, and control (**B**). Abbreviations: (U < E) = before the race; (U > E) = after the race; (U = E) = before the race, after the race.

On the left y-axis (Figure 3A), the difference between the scores for the activity named in the title gives the scaling. That is, the score after the named activity is subtracted from the score before it. Thus, (1) minus means that after scores lower than before, (2) positive means after scores higher than before, or where this does not appear, and (3) before = after. According to these results, enjoyment as a psychological element increased during free practice for only two of the eight riders interviewed. The tension increased for all but one rider. Control showed a similar pattern as tension, with a negative post-stress element in all but two riders and a significant decrease in three cases. On the x-axis, the numbers in the brackets show the free practice (Figure 3C) and the qualifying session (Figure 3D) rankings. The ranking of the competitors and the examined psychological characteristics neither confirm nor contradict the results obtained.

During the qualifying session, the psychological element of enjoyment increased significantly for almost all the riders interviewed, as did the stress-inducing afterwards component. The control component was rated lower afterwards than before by all but one rider (Figure 3B).

The pleasure component for the first race was lower for almost all riders afterwards. Almost without exception, the tension, and stressors were greater after the race than before, regardless of the result achieved. For rider number 5, the enjoyment, tension and control decreased after the race, but the stressor component increased significantly afterwards. For competitor number 1, tension increased significantly, with a milder increase in control, but enjoyment and stressor components decreased (Figure 3C).

In the second race, the answers of five competitors were analyzed. Here, again, the pattern of the components tested varied, with all five children's responses having different patterns per item. Some had increased tension afterwards, but no change in enjoyment before or after. For competitor 3, enjoyment increased significantly, while control decreased afterwards, such that tension remained unchanged with a high stressor component (Figure 3D).

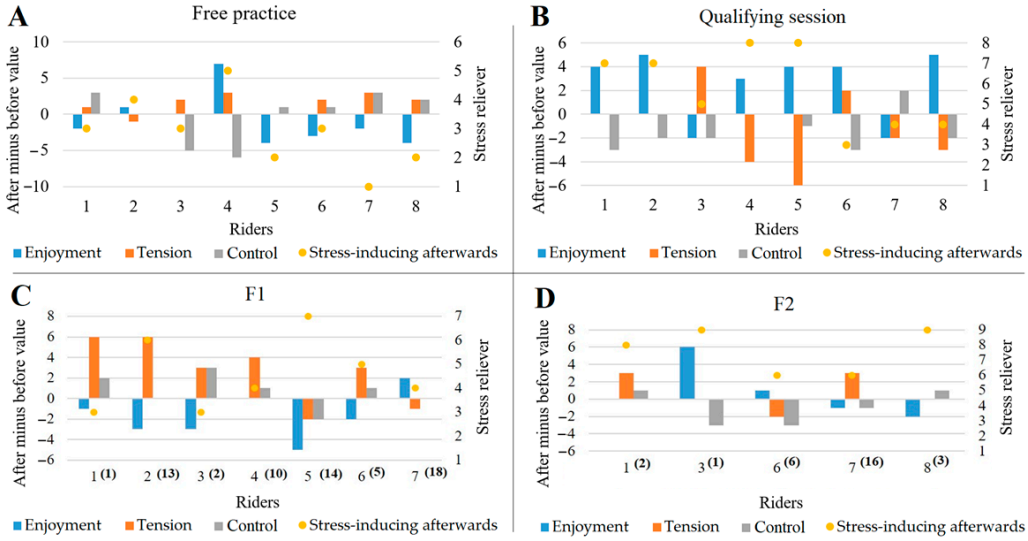


Figure 3. Difference in subjective values of eight MX children before and after (free practice (**A**), qualifying session (**B**), first race (**C**), and second race (**D**)). Abbreviations: F1 = first race; 1(1) = number one; position in brackets1(2) = number one, position in brackets.

4. Discussion and Conclusions

The IZOF model has garnered empirical support to explain states of human functioning and its subsequent impact on sports performance [10]. The central tenet of the (IZOF) model is that each athlete has an individually optimal pre-performance bandwidth (zone/range) of anxiety intensity within which the best performance is most likely to occur. Research evidence suggests that athletes who can control or regulate performance states that allow for the utilization of resources (e.g., attention, energy) to complete the task at hand are more likely to experience superior performance [12]. It was assumed in our research that the aforementioned bandwidth is narrower for athletes who performed more effectively (achieved better placings) during races. The pattern is markedly heterogeneous across individuals and races. In the first race, the bandwidth of the runners who achieved a high result (tension), which in our case corresponds to anxiety, shows a positive trend, i.e., the level of anxiety was higher after the race than before. In the second race, although not all of those who competed in the first race did so, those who competed in both races had a pattern of anxiety that was consistent with the results. That is, in several cases, the anxiety is the same before and after (i.e., 0 difference) or lower after than before. Our hypothesis is partially confirmed and holds for the second race rather than the first.

The present study is part of a larger volume of research investigating the under-researched area of the mental and psychological contribution of motocross riders. The control of pre-competition anxiety of varying intensity and self-confidence (also related to the intensity of pre-competition anxiety) and self-efficacy are considered essential in a high-speed sport where failure can cause serious injury to the athlete or have career consequences [13]. The results of the study show that cognitive and psychological demands are significant in motocross and need to be the focus of further studies.

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Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available because they belong to minors.

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