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Stress and Emotional Management of MotoGP and Superbike Engineers and Pilots

Gestione dello stress e delle emozioni, nei piloti e negli ingegneri di MotoGP e SuperBike

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Abstract

Motorcycle competition is a sports/work environment that requires a high dose of concentration, of the ability to manage stress and emotions, apart from the necessary intense athletic preparation. This study analyzes how engineers and pilots manage stress and emotions prior to and during the world championship competitions of MotoGP and Superbike. 16 engineers and 16 pilots were subject to three types of tests in two different moments during the championship season in order to register their levels of stress and emotional expressions. Data analysis concentrated on identifying any correlations between amount of time the subjects were exposed to such stress and emotions, age of subject, the number of years subject has been active in such environment and, for just the pilots, the type of mental and physical training they did for season preparation. During the pre-championship phase, the levels of stress of both engineers and pilots are different, as the physical and mental work of the former continues, and for the latter the winter break brings them some relief from such stress. Once the championship season begins, such stress increases for engineers but not significantly, whereas for pilots, it appears they have an "off/on" switch which is turned to the "on" position in respect to the previous phase. The most interesting result of this analysis shows that athletes who undergo both a physical and mental preparation are capable of successfully managing the stress generated by the onset of the championship season.

Il motociclismo è un ambiente sportivo/lavorativo che richiede un'alta dose di concentrazione, gestione dello stress, delle emozioni oltre ad una intensa preparazione di tipo atletico. Lo studio ha esaminato come ingegneri di pista e piloti gestiscono lo stress e le emozioni, prima e durante i campionati mondiali di MotoGP e Superbike. A 16 ingegneri e a 16 piloti sono stati somministrati tre tipologie di test, in due momenti diversi del campionato, in modo da rilevarne i relativi livelli di stress e manifestazione delle emozioni. L'analisi dei dati si è incentrata sulla ricerca di eventuali correlazioni tra variabili indipendenti quali, tempo, età anagrafica, anni di attività nel settore, e per i soli piloti anche tipologia di allenamento, fisico e mentale. Durante la fase di pre campionato, i livelli di stress tra gli ingegnere e i piloti sono differente, a discapito dei primi che già lavorano mentalmente e fisicamente in ottica campionato, mentre i secondi hanno una fasi di alleggerimento durante la fase di riposo invernale. Diversamente invece avviene a campionato iniziato, dove il livello di stress degli ingegneri aumenta, ma non in maniera significativa, mentre quello dei piloti ha quasi una sorta di on/off, rispetto a quello rilevato nella precedente fase.
L'analisi sui dati ci fornisce il dato più interessante, mostrando che, gli atleti che affiancano alla propria preparazione fisica anche un allenamento di tipo mentale, riescono a gestire in maniera più efficacie lo stress generato dall'inizio della stagione motociclistica.

Keywords

Mental Training, Motor Sport, Stress, Emotion, Autoregulation

Allenamento Mentale, Sport Motori, Stress, Emozioni, Autoregolazione

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Introduction

"Sports are an emotional experience for many athletes and the emotional state of an athlete can change the outcome of a race by influencing performance during practice and during competition" (Butler, 1996). This definition truly applies to the motorcycle racing world, where levels of attention and perception of a pilot can change his performance results.

The pilot, as also the engineer, are subject to different types of emotions; Lazarus defines them as "a phenomenon that is an organized psycho-physiological reaction to on-going relationships with the environment, most often but not always, interpersonal or social. Vallerand & Blanchard are also of this same train of thought and integrate Lazarus' assertion by going as far as to hypothesize that an individual's emotional state can influence motivation on both the physical and psychological levels.

Factors that can generate stress are multiple but if we consider them in the sports world, as per Janke (1976), they can be divided into five categories: stress of external origin; environment factors that can deprive our sensors ie: water, wind, caps, glasses, etc; stress from lack of primary needs, ie: scorching heat/freezing cold, time change/jet lag, change in diet; performance stress: excessive muscle tension or psychological pressure, doubts, negative experiences; social stress: relationship with loved ones, team members, coaches, parents, teachers; other sources of stress related to future plans or difficult decisions that must be taken.

A crucial point in the mental preparation of an athlete is his/her approach towards environment; this will always change based on athlete's level and type of performance, and he/she must pay close attention to his/her surroundings as this will be a positive or negative source and they must know how to manage it to obtain their best results.

Sports "activation" depends on this approach and from his/her level of preparation, and the lack of these could cause failure in performance.

Based on the approach employed by athletes, sport psychologists have produced over the years numerous theoretic models. Depending on the related activation and performance processes, various theories have been proposed, some of which have yet to be 100% confirmed, but we will nevertheless review them hereafter, along with the classical theories.

The majority of the studies were, for the most part, conducted using the upside down "U" method, proposed in 1959 by Easterbrook, who discovered a relationship between levels of attention and those of activation: at low levels of arousal, attention is focused on relevant and irrelevant information; at moderate levels of arousal, attention is focused only on relevant points, whilst at high levels of arousal, attention is limited only to a few relevant points but not all of them. Thus it is easy to understand how good performance can be achieved by an athlete whose activation level is moderate; the difficult part is to push the athlete to improve his/her arousal level to a higher one as each individual has their own means of approaching and managing external stimuli.

Within the performance/activation theories, we also find the Individual Zones of Optimal Functioning (IZOF), as per Hanin's theory in 1995. Initially this model concentrated on another element that influences performance - anxiety - which, if used at its ideal level, an athlete would be able to reach their so called "peak performance". A few years later, Hanin revised his theory to include positive/negative emotions and how these could also influence performance.

A combination of useful emotions was identified and defined with an idiographic approach for this model to determine their positive or negative impact, depending on the individual. This type of "customized" research on each athlete permits the identification of a greater range of emotions to determine their optimal level of attention without imposing a pre-formulated statistical model; it is at this point that a psychologist's role becomes important to help the athlete identify and determine their optimal performance state.

On the basis of positive emotions and their use to reach optimal performance, a new theory model called Flow, derived from studies by Mihály Csikszenmtihály, one of the leading exponents on Positive Psychology, has gained attention.

Flow is defined first and foremost as a state of consciousness in which the subject becomes totally absorbed by what he/she is doing, thereby blocking out all other thoughts and emotions. More than a moment of concentration, this is an experience in which mind and body are working together, out of context.

At first it is difficult to understand what Flow really is, but if you think about it and apply it in sports, like an "agonistic trance", it is much easier to understand. In auto racing, Formula One driver Ayrton Senna told of his "best experience" during the 1988 Monaco Grand Prix: "I was already in pole position and I kept going faster and faster... Suddenly I was almost two seconds faster than anyone else, including my teammate with the same car, and suddenly I realized that I was no longer driving the car consciously. I was driving it by a kind of instinct, only in a different dimension. It was as if I were in a tunnel ".

The "flow" represents the highest level of exploitation of emotions, of attention, and concentration, to be applied towards performance and learning during the race or match. During the "flow" state, attention is focused on the task, the athlete is not disturbed by his thoughts because he is completely absorbed by his activity and feels he can fully control his actions. The "flow" therefore becomes a stimulating moment because it produces better results, as well as pleasure in work and in sports. The results are better because both emotional intelligence and physical energies are activated.

This theory coincides with mental coaching, a method increasingly being used worldwide in sports to manage anxiety and emotions, and to focus on attention. This model could be defined as dual as it approaches both functions of physiological activation and cognitive strategies.

2. Methods

2.1. The participants

The study's participants were 16 riders, who regularly compete in top championships (average age 28.9 ± 4 years, riding time 14 years ± 4.5 years), and 16 engineers, who also work in the same championships (average age 39.6 ± 10.5 years, activity time 14.2 years ± 9.2 years). In addition, only pilots were asked whether they, apart from physical training, took part in mental training activities, such as coaching sessions or cognitive-specific workouts. All participants took the tests anonymously, without indicating name and/or surname, by simply indicating only a code to the data map. Each participant was explained the purpose of the study, and submitted informed consent in writing before testing began.

2.1.1 Protocol

The tests were conducted with specific timing: during the pre-season pause and during the third race of the World Championship for both participant groups and motorcycle championships, therefore in a test and retest outline. Three questionnaires, which have been validated worldwide, were used: the Perceived Stress Scale (PSS, Sheldon Cohen) specifically for the perceived stress analysis, and then with two others, the "Emotion Regulation Skills Questionnaire" (ERSQ, Berking and Znoj, 2008) and the "Self-Report Measures the Emotion Regulation Questionnaire" (ERQ, James J. Gross and Oliver P. John, 2003).

2.1.2 Perceived Stress Scale

The Perceived Stress Scale (PSS) is the most commonly used psychological tool for measuring stress perception and, based on the certain situations in one's life, measures the degree of stress. The scale also includes a series of direct questions on current stress levels and is designed for use on subjects having at least a junior high school education. In addition, the questions are of a general nature and are relatively lacking in specific content, so they can be used for any type

of context, group, or population, focusing primarily on feelings and thoughts perceived during the previous month.

2.1.3 Emotion Regulation Skills Questionnaire

The Emotion Regulation Skill Questionnaire (ERSQ) is a 27-question self-report that was developed by Berking and Znoj in 2008 to evaluate the adaptive capability of emotional control, referring to the ACE model (Adaptive Coping with Emotions Model).

The ACE model contemplates 9 dimensions / the ability to regulate emotions process:

(a) be aware of one's emotions

(b) identify and label emotions

(c) correctly interpret physical sensations related to emotions

(d) understand the emotional indications

(e) actively change negative emotions to feel better

(f) accept negative emotions when necessary

(g) tolerate negative emotions when they cannot be changed

(h) deal with or avoid negative emotions in uncomfortable situations in order to achieve important goals

(i) support oneself in emotionally distressing situations

All the above listed capabilities are assessed in the questionnaire through a Likert-type measurement scale, based on five points (at 0 = never, at 4 = almost always), and for a specific timeframe, that being the previous week. The nine dimensions listed above are all explored through a series of questions, such as "I paid attention to my feelings" (acknowledgement), "My physical sensations were a good indication of how I was feeling" (sensations), "I was clear about what emotions I was experiencing " (clarity)," I was aware of why I felt the way I felt "(understanding)," I accepted my emotions "(acceptance)," I felt I could cope with even intense negative feelings " (tolerance), "I did what I had planned, even if it made me feel uncomfortable or anxious" (willingness to deal with difficult situations), and "I was able to influence my negative feelings" (changed).

2.1.4 The Emotional Regulation Questionnaire

The "Self-report Measures Emotion Regulation Questionnaire" (ERQ), developed by James J. Gross and Oliver P. John in 2003, is based on the process of emotion control model launched by Gross (1998), which encompasses several different strategies to control them.

ERQ is designed to assess individual differences between cognitive assessment and suppressed expression. Cognitive re-evaluation is defined as an earlier cognitive strategy, from the time it occurs before a person is faced with a stressful situation and determines, above all, a change in emotional impact. On the other hand, suppressed expression is a response strategy that occurs when the person already finds themselves in a stressful situation, hence they already perceive an emotion, and therefore seek to block it.

The Emotion Regulation (ERQ) questionnaire is a 10-question test consisting of two scales which correspond to two different emotion-control strategies: six questions are related to a cognitive-type assessment (questions 1, 2, 3, 6, 9, 10) and the remaining 4 are related to the suppressed expression (item 4, 5, 7, 8). The questionnaire asks the subjects a few questions regarding one's emotional life and, particularly, how emotions are controlled. The 10 questions are evaluated on a Likert scale of seven points, where 1 means "strongly disagree" and 7 means "strongly agree".

3. Analisi statistica

To analyze the various tests, we first standardized them so that we could compare them and we used IT software to perform this task (IBM SPSS Statistics). We defined the time variable

with T0 = Phase "Before Season" and T1 = Phase "During Season"; then we calculated the relative dispersion indexes, and divided them according to each questionnaire, including the standard error, the detection of the minimum value and that of the maximum value, the asymmetry and the curtosis.

The study focused on many aspects, such as stress and emotion manifestation. From the questionnaire analysis, the test that provided significant value for consideration was that of the pilots' stress exercises during the championship season (T1).

Paired Subjects Correlations – Pilots				
		N	Correlazione	Sign.
Coppia 1	PSS_T0 & PSS_T1	16	,670	,005
Coppia 2	ERQS _T0 & ERQS_ T1	16	,525	,037
Coppia 3	ERQ_T0 & ERQ_T1	16	,552	,027

Paired Subjects Correlations – Engineers				
		N	Correlazione	Sign.
Coppia 1	PSS_T0 & PSS_T1	16	,763	,001
Coppia 2	ERQS _T0 & ERQS_T1	16	,444	,085
Coppia 3	ERQ_T0 & ERQ_T1	16	,667	,005

Independent Subject Test										
F		Levene test for variances equality		/ Test t for mean equality						
		Sign.	T	gl	Sign. (a 2 code)	Diff. della media	Diff. errore std	Confidence Interval Range of 95%		
								Inf.	Sup.	
STRESS T1	Presumed Variations	1,698	,214	2,105	14	,054[a]	5,286	2,510	-,099	10,670
	Same Variations Not Presumed			1,986	9,581	,076	5,286	2,661	-,679	11,250

[a] *Significance close to 0.05, due to limited sample of pilots.

All tests were evaluated by using independent t-test and Levene Test samples for variance equality.

4. Results

The data on conflict parameters are given in Table 1. For clarity, the magnitude of the different types of significant flaws are indicated only if less than 0.05.

4.1 Perceived Stress Scale

When the questionnaire was carried out, we noticed that the difference of the engineers' average data in the two surveys was minimal compared to the average data of pilots and we could therefore assume that, during the winter break, there is a decrease in stress perceived significantly for the pilots with respect to their engineers. We could also add that the "peak" of perceived stress by the pilot hits him just before performance, whilst the engineer has a fairly constant perceived level of stress between pre-championship development and during the championship season.

During analysis, we noted how emotional order has an asymmetric trend to the right, thus positive, and in a more pronounced manner for the pilots. We also found the presence of abnormal values, outliers, in both categories, and this can also be attributed to an incorrect data cleanup at the time of acquisition. Unfortunately, the fact of having a limited number of test subjects did not allow us to evaluate whether to take into consideration this data or ignore them.

4.2 Emotion Regulation Skills Questionnaire

When conducting the second test (ERSQ), we noticed that the mean scores tend to decrease with the onset of the championship; this leads us to say that there may be a slight lack of recognition and management of their own emotions. From the ERQS box plot shown, we noted that the emotional order has an asymmetric trend to the left, thus negative. Even in this case we find the presence of an abnormal value, but only for the pilots.

5. Discussion

The purpose of this study was to examine how stress and emotions are perceived at different times in the two motorcycle world championships. We took into consideration two different types of subjects - pilots and their engineers - in order to perform a comparative analysis of how different figures within the same environment responded to the same stress.

Initially, our goal was to verify a few hypotheses that could be related to individual subjects, to age, to experience gained in the field and over time, as well as see if there was some kind of correlation between pilot-engineer. Unfortunately, literature in this field is almost non-existent, so we went forward with a series of questionnaires that would allow us to gather as much data and viewpoints as possible.

By indirect observation and standardization of all scores, we tried to verify one by one our assumptions, starting with the analysis of data significance gathered from our questionnaires. Despite score variations obtained by cross-checking the questionnaires with independent variables such as age, experience, and time, no significant information could be identified to confirm any correlation, yet we still obtained indexes that can used for further in-depth analysis in some areas, such as the level of stress perceived in relation to the time accumulated in the environment.

Contrary to common thinking, the hypothesis on possible correlation between experience, emotion, and stress – for both pilots and engineers - is proved otherwise as there is no link that identifies a relationship between these variables. There is an increase of stress perceived by both subjects, but not significant enough to prove the hypothesis. The same issue is also shows in the tests on skills and on emotion manifestation: there are variations, directly or inversely proportional but not significant enough to permit us to prove the hypothesis.

6. Conclusion

We must begin with the assumption that from all these data collected, one must bear in mind that the context of normality of allocation and the homogeneity of variance are violated. This may depend on several factors, but for our study, it is mainly due to the small number of participants.

Certainly, the biggest difference of the two surveys conducted is that the engineers' mean is minimal when compared to that of the pilots, hence we can assume that during the winter break, there is a drop in significant perceived stress for the pilots compared to their engineers. We could also add that the "peak" of perceived stress by the pilot hits him just before performance, whilst the engineer has a fairly constant perceived level of stress between pre-championship development and during the championship season.

Moving on to the second test (ERSQ), we can see how the mean scores tend to decrease with the onset of the championship season, as if there was a slight lack of recognition and management of their own emotions. A further analysis could be carried out from this test which would break up the questions into 9 clusters, and analyze what Gross-defined dimensions changed most between the winter break phase and the onset of the championship season.

In closing with the ERSQ, we can see that the mean scores between Pilots and Engineers vary, with emotion manifestation in pilots decreasing on average, whilst it increases in engineers. This data may suggest that there is a tendency for pilots to control their emotional manifestations and that their engineers do not.

However, an "almost significant" data was found in the analysis of the Stress_T1 variable regarding Mental Training. This significant data is almost certainly due to the limited number of pilots involved, but we can assume that said training does indeed affect the pilots' perceived stress during the championship season.

For sure, the population is not numerous, but the study can be considered representative, and allow us to obtain some indications on which direction to move forward and what variables to focus our studies on, even if bonafide conclusions cannot be made. Perhaps furthering research on what types of mental training are used and in what way, rather than whether stress and emotions based on pilot rankings vary.

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