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# The potential effects of relevant symptoms perceived by athletes and coping strategies upon athletics performance in competitive sport events

## Abstract

**Objectives:** The current study aimed to underline the relevant symptoms perceived by athletes as well at examining the coping strategies which help them improve their performance in competitive sport events.

**Methods:** 18 Tunisian national male athletes specialty 400m were voluntary recruited for this study. All of them were ranked in the top scorers at Tunisian national championship and competing at recent World Championships. Athletes first completed the inventory of stress symptoms before the competition and immediately following the trial, then they were asked to complete the Inventory Questionnaire of Coping Strategies in Sports competition.

**Results**: The findings revealed that the development of the physical and psychological symptoms can impair the performance of the athletes. To cope with this stress, athletes use the Task-focused coping strategies and especially Effort expenditure and relaxation one. Likewise, athletes used more often *Seeking support* and *Distraction distancing* when the source of stress was related to physical problems.

**Conclusion**: Its recommend that coaches should keep up related strategies in training sessions in order to control and modify the tension and stress before competition in a planned and regular method and coping strategies.

**Keywords:** stress, coping strategies, intensity, controlability, performance

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## Introduction

The precompetitive period is widely perceived by sport psychologists as being stressful for the athlete and requiring specific coping strategies in order to maximize the possibility of a good performance.[1–5] Lazarus & Folkman[6] defined stress as: 'a pattern of negative physiological states and psychological responses occurring in situations where people perceive threats to their well-being, which they may be unable to meet'. There are a number of individualised causes of stress. Sport environments vary according to 4 the underlying demands that are placed on the individual, including:

a. Novelty
b. Predictability
c. Event uncertainty
d. Imminence
e. Duration
f. Temporal uncertainty
g. Ambiguity
h. Preparation
i. Self/other comparison.[7]

It is quite common to have a number of athletes in similar stressful situations yet they totally prove different stress responses to those situations. Among the various individualized factors that can have an impact on an athlete's performance are personality, motivation, stress, anxiety and arousal. The major reasons for stress that have been reported by sports performers include fear of failure, concerns about social evaluation by others (particularly the coach), lack of readiness to perform, and loss of internal control over one's environment. The intervention strategies that are implied by the cognitive and physiological processes and which are thought to underly these effects are also reviewed. Some athletes use their stress to generate the physical and mental energy they need for the accomplishment of an optimal athletic performance, while others feel intense physical discomfort and serious psychological concerns that prevent them from reaching the desired performance level.

In athletics, the performance depends on the judicious planning of the training loads and methods as well as on various physiological, biomechanical, technical, tactical and psychological components specific to the specialty of the athlete. It is positively or negatively affected by various psychological factors including anxiety, confidence, concentration, motivation and stress. Stress frequently appears when athletes are training for competition. The preparation for the competition entails physical and physiological manifestations : lead weight in the stomach, lump in the throat, sleep disorders, heart palpitations, etc. Being able to manage stress before, during and after competition is, for coaches, athletes and sports psychologists, a key aspect of an optimal sports performance. However, despite this consensus, no much time is devoted by some coaches and athletes for the learning, development and use of stress management strategies. In

the sports-related context, a number of studies focused on this issue. Anshel and Kaissidis[1] showed that depending on the situation nature, sportsmen, specifically basketball players, use different strategies for different events.

Athletics performance can be enhanced by the use of certain psychological strategies. In recent years, several researchers began working on empirical approaches to the strategies used by athletes in order to manage the stressful demands encountered in sport settings. Coping strategies are part of the stress transactional model of Lazarus and Folkman.[6] Athletes, nevertheless, will engage in coping to regulate the impact of competitive suffering.[9] Coping is a process of cognitive and behavioral attempts to deal with demands that exceed one"s resources.[10] In sport, three general stages of competition (before, during, and after) have been applied, as situational demands differ across these three phases.[11,12] More specific phases of an emotional encounter have also been successfully applied to investigate the coping process, derived from shifts in demands and resources rather than pre-existing phases of competition. In fact, empirical evidence in mainstream and sport psychology advocates the fact that coping actions change across situations,[12–15] across the same situation over time,[15,16] and across the distinctive phases of a given situation.[17,18] Accordingly, the coping process is significantly relevant for sport researches, in the light of the implications of coping for the performance and well-being of athletes.[19] The current study aimed to underline the relevant symptoms perceived by athletes and which prevent them from reaching the desired performance level. The study aimed also at examining the coping strategies that sport performers could use to overcome these effects which help them improve their performance in competitive sport events.

## Method

### Participants

Eighteen Tunisian national male athletes were voluntary recruited for this study. All of them were ranked in the top scorers at the last Tunisian national championship and competing at recent World Championships. They were senior category specialty 400m and their athletic experiences were at least of 10-years. Before starting the experiment, athletes were invited to sign an informed consent to participate in the study and completed each scale in the order presented. They were therefore given detailed instructions to perform their races accurately and efficiently. All were in training for a competition at the time of data collection.

### Procedure

The experimental protocol was performed in accordance with the Declaration of Helsinki for human experimentation and was approved by the ethical committee. During athlete recruitment, study procedures were verbally explained to potential participants. It was explained that athletes would be asked about stress and coping strategies used during the completion of a 400m running trial. Written consent was obtained from all participants prior to starting the study. Before the experimentation, participants completed a demographic questionnaire. The demographic information included age, gender, socioeconomic status, years of competitive experience in long distance running, weekly training hours, and recent race times. Athletes first completed the inventory of stress symptoms before the competition and immediately following the trial, participants were asked to cool down, for as long as necessary then they were asked to complete the Inventory Questionnaire of Coping Strategies in Sports competition (ISCCS). In consideration of the many practical challenges that hamper the collection of information from athletes during competitive events (i.e., little or no time available to respond to research questions), experimenters typically gather coping information immediately after the conclusion of the event using retrospective recall. Three questions were asked outside the experimental tool, exactly after the coping inventory. This is necessary to fully appreciate the complex nature of stress.

The variables measured upstream of the strategy questionnaire were:

1. Stress intensity.
2. When they had been stressed.
3. The perceived level of controllability of the situations.

The information collected is stored in a database in Excel to be evaluated after the Tunisian national championship. Inventories were administered by a specialist of sport psychology who was present in order to explain to the participants how to complete the inventories and answer any questions that arose.

A number of measurement tools were applied in the research as follow:

### Inventory of stress symptoms

The Inventory of stress symptoms is intended to assess the adaptive responses to stress, i.e., to evaluate the reactions of the body when exposed to stressors. This questionnaire helps to become aware of all manifestations of our current tension.[20]

The following grid shows the symptoms of stress experienced during the last month. Each symptom is followed by the numbers 0, 1, 2 and 3. We answer by checking the 0 if we did not feel the symptom at all. We tick the 1 if we felt it a little or rarely. Tick the 2 if it has been felt moderately or quite often. We tick the 3 if we felt it very much or continuously.

The variables measuring upstream of the strategy questionnaire were:

1. Stress intensity (on a scale of 0 to 10)
2. Regardless of the nature of the situation, the perception of stress can be more or less strong. We asked the subject to position himself on a scale of 0 to 10, in order to express the intensity of perceived stress. This calibration was interesting because some theoretical data showed that the intensity of the stress episode affects the number of strategies deployed and the nature of the stress episodes. In addition, knowledge of extreme intensity might suggest that the subject was under the influence of his emotions.
3. When they had been stressed (before, during, after assessment)
4. These differences were important to know because the times of stress confrontation differ radically depending on the context in which the stress appears. When the individual is engaged in a motor act, it is extremely short, it is a very short cognitive time, because the subject is in the temporal urgency. In the case where the situations appear outside of a "A commitment to sport, moratoriums are less restrictive. However, in this second case,

two cases must be distinguished. A situation where the subject has not yet entered the evaluation process (during the warm up, while awaiting his turn) and a second where the subject is in a rest phase (half-time, dead time...) and which is integrated into the competition.

5. The perceived level of controllability of the situations (on a scale of 0 to 10).

6. In terms of controllability, the subjects had to specify whether the event was controllable by positioning it on a scale of 0 to 10. The zero expressing an uncontrollable event. In the evaluations of their sports practices, certain events, such as those related to the realm of execution, depended only on the subject itself. In other situations, the result of a sporting action could depend on parameters on which the subject could not act or decide. As suggested by these two examples, the level of controllability, whether or not objective, could vary from one situation to another. These indexes of controllability seemed interesting to us considering the impact they can have on the modes of confrontation chosen by the athletes.[11,12,21]

### The Inventory Questionnaire of Coping Strategies in Sports competition (ISCCS)

Inventory of Coping Strategies in Sports Competition,[21] comprising 39 items, was used to measure the ten coping strategies adopted by Gaudreau et al.[29] in their multivariate model:

*Task-oriented coping*: effort expenditure (3 items, e.g., "I applied myself by providing a constant effort"); The mental imagery (4 items, e.g., "I have isolated myself in a favorable place for reflection"); The control of thoughts (4 items, e.g., "I tried not to be intimidated by the other athletes"); The search for support (4 items, e.g., "I asked for advice on my mental preparation"); Relaxation (4 items, e.g., "I tried to relax my body"); Logical analysis (4 items, e.g., "I analyzed my previous performance").

*Distraction-oriented coping*: The distribution of unpleasant emotions (4 items, e.g., "I expressed dissatisfaction"); The distancing (4 items, e.g., "I have made the void around me"); Mental distraction (4 items, e.g., "I did some fun not to think about the game").

*Disengagement-oriented coping***:** Disengagement/resignation (4 items, e.g., "I wanted the match to end immediately"). For each item, athletes rate the use of each strategy using a five point Likert scale ranging from 0 (representing "not at all") to 5 (representing "very much so"). Analysis of the Cronbach's alpha coefficients indicated that 9 of 10 scales showed satisfactory internal consistency beyond the .60 threshold recommended by Nunnally and Bernstein (1994) (i.e., alpha between .64 and .82)

### Competitive 400 metres task

Upon their arrival, subjects started a standardized warming-up including three steps (35). First, subjects performed a 5 min self-paced jog/run general warm-up followed by 4 minutes of active rest, which consisted of walking on the track. Second, subjects completed the dynamic stretching warming-up during 15-17 min. Third, subjects performed incremental intermittent sprints during 5min. Then, participants completed the 400 metres on a standard outdoor running track, Data collection was performed on National Day of jumps and throws in Tunisia.

### Statistic analysis

Data were reported as median±interquartile range (IQR) and confidence intervals at the 95% level (95% CI).The Chi square test was applied to determine the nature and the level of stress as well as, the coping strategy.The non-parametric Wilcoxon Rank-sum test was applied to compare the symptom of stress pair-wise. Association between variables was assessed using Spearman's Rho correlation coefficients. The magnitude of effects was qualitatively assessed as follows: trivial r<0.1, small 0.1<r<0.3, moderate 0.3<r <0.5, large 0.5<r<0.7, very large 0.7<r<0.9, nearly perfect r > 0.9 and perfect r=1 (Hopkins, 2002). Significance was set at 0.05% ($p \leq 0.05$). Statistical analysis was performed using Statistical Package for the Social Sciences version 20.0 (SPSS Inc., Chicago, IL, USA).

## Results

### Coping strategies

A correlation was performed between the coping strategies and the subscales to determine the most dominant coping strategy used by the athletes. Then, we compared the percentage obtained for each subscale (Table 1) one by one in the different form of coping to determine whether or not they had an influence on the forms of coping used. The results showed a moderate correlation between *Mental imagery* and *Though control*, but a large correlation with *Relaxation* and *Disengagement* ($r$=0.488, 0.543and 0.582, respectively with $p$ <0.05). Also, a large correlation between *Venting of unpleasant emotions* and *Effort expenditure* ($r$=0.605,$p$ <0.01), as well as *Mental distraction, Seeking support* and *Disengagement registration*($r$=0.623,and 0.547, respectively with $p$ <0.01).

A significant difference in Task-focused coping subscales ($\chi^2$=58.30, with $p$<0.001) was observed. To cope with the stress of the race, students use more *Effort expenditure* with a maximal score (65%) as compared to the other subscales on which main significant differences were observed. The need for physical engagement and motor coordination appears as a possible solution to cope with the stress of the assessment (Table 1). However, the athletes involve the Relaxation strategy thereafter with a score of 60°%.

Regarding the other coping strategies, athletes generally have less recourse to Mental distraction and Registration to minimize to cope with the stress respectively (50%,45%).

1. Physicals and psychologicals stress symptom

2. The comparison between physical and psychological symptoms of stress, showed significant differences between the scores recorded. Accordingly, we noted a slightly effect of Muscular tension symptom (61.11%, $\chi^2$=6.33, with $p$ <0.05) and main effect of motivational symptom (72.22%, $\chi^2$=21.55, with $p$<0.001). Whereas, there was a great consistency between the results of the Behavioural, intellectual, relational and Existential scores of psychological symptom of stress (Figure 1).

3. Intensity Moment, and Level of perceived stress

The *Intensity* and *Level* of perceived stress is moderate (66.67%, $\chi^2$=10.33 and 72.22%, $\chi^2$=13 with $p$<0.001, respectively), the *Moment* of stress have main significant effect during the competition phase (66.67%, $\chi^2$=8, with $p$<0.05) (Figure 2).

**Table 1** Descriptives analysis of coping subscales strategies

| Coping forms | Median | IQR | Percentage (%) |
|---|---|---|---|
| Task -focused coping Mental Imagery | 8.00 | 2.25 | 40 |
| Task -focused coping/Effort expenditure | 13.00 | 4.00 | 65 |
| Task -focused coping/Though Control | 11.00 | 2.25 | 55 |
| Task -focused coping/Seeking Support | 7.50 | 4.00 | 37.5 |
| Task -focused coping/Relaxation | 12.00 | 2.00 | 60 |
| Task -focused coping/Logical analysis | 11.00 | 2.25 | 55 |
| Disengagement/Venting of unpleasant emotions | 7.00 | 3.25 | 35 |
| Disengagement/Registration | 9.00 | 8.50 | 45 |
| Distraction/Distancing | 8.00 | 5.25 | 40 |
| Distraction/Mental Distraction | 10.00 | 3.25 | 50 |

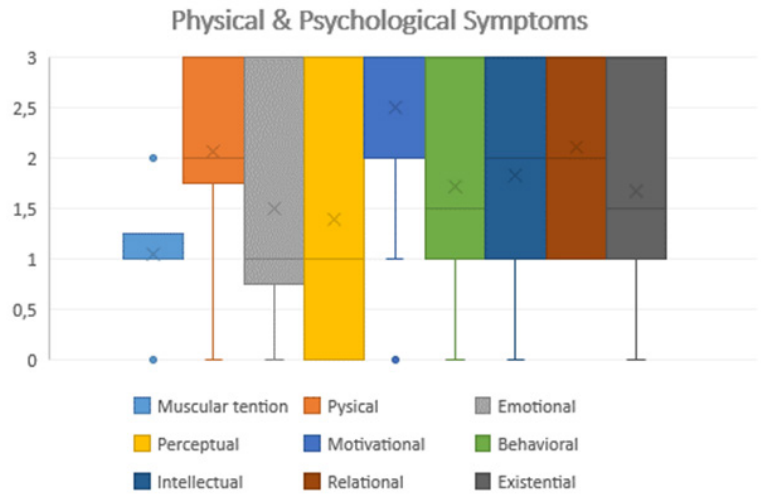


**Figure 1** Comparison between physical and psychological symptoms of stress.


**Figure 2** The intensity, the moment and the level of controllability of perceived stress.

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The correlative analysis highlighted a significant relation between Mental imagery and Moment of perceived stress ($r$=0.495, $p$<0.05), Seeking support and Perceptual as well as Intellectual symptoms ($r$=0.550and 0.495, respectively with $p$ <0.05), Logical analysis and Existential symptom ($r$=0.543, $p$<0.05), Venting of unpleasant emotions and Level of stress ($r$=0.543, $p$<0.05), and Distraction distancing and Moment of perceived stress ($r$=0.619, $p$<0.01).

## Discussion

The purpose of the present study was to investigate the most perceived symptoms of stressn by 400 m athletes and to identify the most coping strategies used to cope with stressfull situations during the competitive sport events.

### Physical and psycholocical Stress Symptons

The findings of this study revealed that the most noticeable stress symptom is focused on *Muscular tension symptom*. It seems therefore that, stress is caused by apprehensive behavior observed and was manifested before the competition by pain or cramps in any of the body's muscles. This symptom can also be experienced as muscle spasms, twitching, 'clamping up,' and persistent pain during sport event.

Therfore, being stressed causes the body to produce the stress response, which secretes stress hormones into the bloodstream and in the body to bring about specific physiological, psychological, and emotional changes that enhance the body's ability to deal with a threat—to either fight with or flee from it—which is the reason this response is often referred to as the fight or flight response.[22]

One of the physiological changes the stress response brings about is that it causes the muscles in the body to contract. Tight muscles make the body more resilient to attack when in dangerous situations.When stress responses occur infrequently, the body can recover relatively quickly from the physiological, psychological, and emotional changes the stress response brings about. This can make muscle tension temporary and not seem problematic. Accordingly, the tension a body carries can adversely or favorably affect physical performance of a task.

Regarding *The psychological stress*, the results suggest, that the athletes show their stress in a motivational way. Whereas, there was a great consistency between the Behavioral, intellectual, relational and Existential scores of psychologicals symptom of stress. Therefore, if one lacks motivation or even the most modest amount of arousal to stay focused and get going, one's performance on various tasks is likely to suffer. Previous study[23] concluded that learning has an optimal level of motivation or drive associated with it, and that when motivation exceeds this level, performance suffers. Shortly afterward, other study,[24] reported in his seminal paper on the relationship between stress and performance (the effects of emotion on cue utilization), argued that there is an optimal level of stress associated with cue sampling (attention allocation) as one scans and absorbs the various stimuli in his or her environment. Easterbrook JA.[24] proposed that the effects of arousal under stress were motivational in nature, serving to better organize a course of action, as opposed to emotional, leading to a disruption in performance. But, previous studies led to postulated as well that emotions are seen as managing both motivational resources and regulating behavioural and cognitive activation.[25–27]

### Coping strategies

Respecting the ability to cope with the demand, the analysis of the Task-focused coping strategy subscale revealed that *Effort expenditure* is appear as occasionally mobilized strategies that has been used by high-level athletes and is the highest percentage of all measurements. Hence, engagement in a high-energy practice, as is the case for the 400m event, could explain this result. To be successful, athletes are forced to engage physically with maximum intensity. It is a question of running as fast as possible, of sprintering for a relatively long time spanning between 50 seconds and 1 minute 20 depending on the level. But the physiological resources mobilized bring more than 30 seconds of sensations of heaviness, muscular pains related to the production of lactic acid. To limit the loss of time associated with this unavoidable energy functioning, and to cope with the stress that emerges from this situation, athletes must continue to maintain the intensity of its effort. In the absence of this investment, the latter will crumble and the timing will diminish, which may increase the source of initial stress or create another.

It is not surprising that *Effort expendituure* is part of the fighting strategies and that it is used more in relation to basketball. In wrestling, athletes can not at any time disengage from the physical relationship with the opponent, which they can do given the level of play produced.

As suggested earlier, a barrage of emotional encounters occur throughout the person-environment event of a competitive race as runners contend with varying temporal demands (i.e., the crowded starting line, maintaining appropriate pace during the race, or meeting with a coach to debrief about performance after the race). Furthermore, coping changes across contexts.[12] For example, a runner may be confronted with different stressors from one situation (i.e., local road race) to another (i.e., national-level competition) and subsequently engage in different coping efforts. As a result, coping efforts are said to be constantly changing.[6]

In an individual sport, similar measures were made on decathletes.[28] They are athletes who practice athletics and who must carry out 10 events (100m, length, weight, height, 400m, 110m hurdles, disc, perch, javelin and 1500m) on two days of competition. The study shows that during their competition, athletes implement at least six different strategies (imagery, detachment, effort deployment, social support through peers, concentration, problem solving.

In this 400 m, to cope with the stress of the race, it also appears that the athletes are more involved in a strategy of relaxation. It would seem that this spontaneous investment in a relaxation activity is used to better cope with the intensity of physical effort. The threat perceived by the fear of physical pain perhaps creates physical tensions that are lifted or mitigated by the practice of a relaxing activity. By engaging in this practice, students seek to recover or persuade themselves that they will have the necessary physical.

Regarding the others coping strategies, athletes generally have less recourse to Mental Distraction and Disengagement/Registration to minimize to cope with the stress.

Interestingly, a study conducted on golf players,[29] magical thinking appears to be present to protect athletes from doubts and negative thoughts. The increase in effort is logical since golfers know that they will have to go to the end of themselves. Disengagement is more frequent during the competition. A priori, this result is paradoxical

since one might think that athletes need to be concentrated on their task. However, this result can be explained. Golf players may at certain moments of the competition disengage, in refuse to be stuck by various thoughts. They are then led by the motor automatisms they built during their training hours.

### Intercorrelation between perceived stress and coping strategies

As regards the *Perceived stress*, through a correlative analysis the findings of the curent study revealed that the *Intensity and Level* of perceived stress were moderate. To minimize the intensity of their stress, athletes would seek to regulate a stressful psychological state. However, it is interesting to note that students also use, and importantly, task-oriented strategies.

Given the particularities of athletics and to face the stress associated with the 400 m event, the athletes are working hard. This effort production, primarily physical, is used to limit the intensity of perceived stress. By engaging thoroughly in their race, the athletes could minimize for example the fear of not being able to finish their ordeal.

In this 400m, it also appears that the athletes engage more in a strategy of Logical analysis, Existential symptom and Venting of unpleasant emotions. It would seem that this spontaneous investment in these strategies is used to better cope with the intensity of physical effort. The threat perceived by the fear of physical pain may create physical tensions that are lifted or mitigated by the environmental stressors. By engaging in this practice, athletes seek to recover or persuade themselves that they will have the necessary physical resources.

In addition, concerning the correlation between coping and moment of stress, the results led to the postulate that *Perceptual, Intellectual symptoms, Logical analysis* as well as *Existential* symptom are related to the moment of perceived stress. Likewise, *Seeking support* and *Distraction distancing* and Moment of perceived stress are correlated.

Therefore, athletes used more often *Seeking support* and *Distraction distancing* when the source of stress was related to physical problems during performance. These results are consistent with the previous study[16] which realize a rather similar protocol by examining the strategies put in place by swimmers on 3 competitions. The results show that the *Seeking support* appears systematically but in different proportions according to the stake of the competition. This shows that, to face the different sources of stress, the activated strategy patterns are not the same for 400m athletes. To refine a gesture, to be more precise in the execution of a skill of whatever nature, the athletes are oriented towards particular modes of confrontation.

## Conclusion

This study investigated the most common symptom of stress and the most coping strategies hat has been mobilized by high-level athletes. An important feature of the current study zs well was the investigation of the Intensity, Level and the Moment of the stress impact (before, during, or after) on a specific competitive event which could prevent them from reaching the desired performance level. From an applied standpoint, the interest findings of this study are characterized mainly by the development of the physical and psychological symptoms that can impair the performance of the athletes. The current results showed that the physical and psychological symptoms are activated as soon as the subjects are stressed. Therefore, to cope with this stress, athletes use the Task-focused coping strategies and especially Effort expenditure and relaxation one. Likewise, athletes used more often *Seeking support* and *Distraction distancing* when the source of stress was related to physical problems during performance. The curent study revealed as well that the *Intensity and Level* of perceived stress were moderate.

Therefore, the current findings have important practical implications for athletes because stress management is fundamental to success in several sports. Regardless of the nature of the research, several considerations are important to ensure the effective investigation of stress and coping in sport event. First of all, the investigation of efforts to cope with competitive stressrors over long periods of time, such as a competitive season. Another future direction is to establish the effect of stress sources on the strategies of coping, used in different sports practices to better understand the modes of confrontation with stress. In sum, we recommend that the coaches should keep up related strategies in training sessions in order to control and modify the tension and stress before competition in a planned and regular method and coping strategies.

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## Conflicts of interest

The authors declare that there is no conflict of interest.

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