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Exploring the relationship between cognitive emotion regulation strategies and athletes' mental toughness

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**EXPLORING THE RELATIONSHIP BETWEEN
COGNITIVE EMOTION REGULATION STRATEGIES AND
ATHLETES' MENTAL TOUGHNESS**

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Resumo

A robustez mental é considerada um elemento-chave do desempenho desportivo. Estudos anteriores mostraram que uma das competências psicológicas relacionadas com a robustez mental é a regulação emocional. Contudo, o grau em que a robustez mental dos atletas é prevista pela sua capacidade de regular emoções utilizando estratégias cognitivas não foi estudado aprofundadamente. Portanto, o presente estudo analisou a associação entre a utilização de estratégias cognitivas de regulação emocional e a robustez mental nos atletas. Diferenças intra-individuais entre o uso de oito estratégias cognitivas de regulação emocional, bem como entre os níveis de desenvolvimento de três fatores da robustez mental (e.g., confiança, constância, controlo) também foram examinados. Para isso, uma amostra de 162 atletas adultos ($M_{idade} = 20.76$ anos, $SD = 3.63$), praticantes de várias modalidades, completaram dois instrumentos para medir as estratégias cognitivas de regulação emocional e a robustez mental. As análises de variância revelaram que os atletas geralmente reportaram utilizar estratégias adaptativas com maior frequência do que estratégias mal-adaptativas, e que a constância foi o fator de robustez mental mais desenvolvido, seguido da confiança e depois do controlo. As análises de regressão mostraram que as estratégias cognitivas de regulação emocional explicaram quase metade da variação da robustez mental. Enquanto a reavaliação positiva e planeamento foi uma estratégia que previu positivamente a robustez mental e todos os seus fatores, a ruminação e o colocar em perspetiva foram preditores negativos da robustez mental. Estes resultados sugerem que a reavaliação positiva e planeamento parece ser uma estratégia cognitiva útil para apoiar a robustez mental dos atletas e, possivelmente, melhorar o seu desempenho desportivo.

Palavras-chave: Estratégias cognitivas; Regulação emocional; Robustez mental; Psicologia do desporto.

Abstract

Mental toughness is considered a key element of sports performance. Previous research showed that one of the psychological skills related to mental toughness is emotion regulation. However, the degree to which athletes' mental toughness is predicted by their ability to regulate emotions using cognitive strategies has not been thoroughly researched. Therefore, the present study analyzed the association between athlete's use of cognitive emotion regulation strategies and mental toughness. Intra-individual differences between the use of eight cognitive emotion regulations strategies, as well as the development levels of three mental toughness factors (e.g., confidence, constancy, control) were also examined. For that, a sample of 162 adult athletes ($M_{age} = 20.76$ years, $SD = 3.63$), from a variety of sports, completed two instruments to measure cognitive emotion regulations strategies and mental toughness. Analyses of variance revealed that athletes generally reported to use adaptive strategies more frequently than maladaptive strategies and that constancy was the most developed mental toughness factor, followed by confidence and then control. Regression analyses showed that the cognitive emotion regulation strategies explained nearly half the variation of mental toughness. Whereas positive reappraisal and planning was a strategy that positively predicted general mental toughness and all its factors, rumination and putting into perspective were negative predictors of mental toughness. These results suggest that positive reappraisal and planning seems to be a useful cognitive strategy to support athletes' mental toughness and, likely, enhance their sports performance.

Keywords: Cognitive Strategies; Emotion regulation; Mental toughness; Sports psychology.

Introduction

Nowadays, it is well accepted that all sport's contexts should be viewed as a holistic system, including multiple components. Alongside physical, technical and tactical components, psychological factors play an important role in the athletes' success, by reinforcing or inhibiting their sport performance (Erdoğan & Kocaekşi, 2015). Considering this, our study focuses on a composite variable that integrates several psychological dimensions (e.g., emotion, cognition, motivation, behavior), which is mental toughness. This variable is considered a key element for excellent performance by athletes, coaches, sport administrators and the media (Gucciardi, 2008). Despite being a relatively stable construct, mental toughness can be trained and developed through psychological skills training programs (Golby & Wood, 2016; Jones et al., 2007; Sheard et al., 2009). Some psychological skills that appear to be related with increases on athletes' mental toughness are self-talk, emotional regulation and relaxation (Crust & Azadi, 2010). There is plenty of literature that emphasizes the importance of emotion regulation in sports performance (e.g., Crust & Azadi, 2010; Gucciardi et al., 2008; Jones, 2003; Lane et al., 2011). However, the athletes' ability to cognitively regulate their emotions, along with its relationship with mental toughness has received scant attention. This was the primary goal of the present study, in which we explored the link between cognitive emotion regulation and mental toughness in adult athletes.

1. Mental toughness

What is mental toughness? How can it be defined and measured? In which way can it be enhanced in athletes and to what purpose?

A definition of mental toughness that is widely accepted is a “valuable personal resource underpinning high quality athletic performance and success in sport” (Cowden et al., 2020, p. 2). Despite being probably one of the most used constructs in applied sports psychology, mental toughness is also one of the least understood ones (Jones et al., 2007). Thus, there is still controversy around the questions raised above, given the complexity of this construct. The literature highlighted the following issues surrounding mental toughness: (a) conceptual ambiguity and confusion (Connaughton et al., 2008; Jones et al.,

2007), along with (b) dimensions diversity and overlap (Rosado et al., 2013), which relate to the existence of several theoretical models including different factors; (c) resemblance with other constructs, particularly resilience, coherence and hardiness or mental resistance (Connaughton et al., 2008; Rosado et al., 2013); and (d) difficulty to operationalize the construct in a consistent manner, generating lack of scientific rigor (Gucciardi, 2008; Jones et al., 2007).

Due to operationalization problems, few valid and reliable psychometric instruments are available to measure mental toughness (Gucciardi, 2008; Jones et al. 2007; Sheard et al., 2009), being *Mental Toughness 48 Inventory* (MT48; Clough et al., 2002), *Mental Toughness Inventory* (MTI; Middleton et al., 2004b) and *Sports Mental Toughness Questionnaire* (SMTQ; Sheard et al. 2009) some of the scarce examples. For this study, the conceptualization of mental toughness is sustained on the research supporting the SMTQ. This instrument is based on the positive psychology paradigm, meaning that mental toughness is framed as a cluster of individual characteristics through which athletes can endure and deal with sport's demands (Sheard et al., 2009). The authors recognized the conceptual affinity of this positive psychological construct with other ones, in particular hardiness, optimism, and positive affect. However, they conducted a divergent validity analysis for the instrument and concluded that, despite the similarities, there is satisfactory distinction and independence between them (Sheard et al., 2009).

As a global and multifaceted factor, mental toughness can be organized into more specific dimensions (Gucciardi et al., 2008; Jones et al. 2007; Sheard et al., 2009). In SMTQ, the dimensions are designated Confidence (vs. self-doubt), Constancy (vs. irresolute) and Control (vs. agitation). Confidence can be defined as the athlete's belief in his/her competence to achieve goals and be better than his/her opponents. Constancy is a vast dimension, which includes tenacity to reach sport's demands, personal responsibility, and ability to focus. Control consists in the athlete's perception that he/she can master his/her life events and emotions, and obtain desired results (Sheard et al., 2009). Mentally tough athletes have all the former dimensions well developed; thus, they are able to overcome adverse and challenging situations effectively, by remaining calm, confident, focused and determined, believing they can have influence over their actions and, ultimately, achieving their goals (Rosado et al., 2013; Sheard et al., 2009).

These psychological characteristics that constitute mental toughness are mainly considered dispositional in SMTQ (Sheard et al., 2009). However, Sheard et al. (2009), in line with other authors (e.g., Golby & Wood, 2016; Jones et al., 2007), stated that mental

toughness can be developed and should be trained among athletes. Mental toughness is influenced not only by internal and genetic factors, but also by situational and acquired ones, which can be targeted through training (Cowden et al., 2020; Eubank et al., 2017; Gucciardi et al., 2008; Rosado et al., 2013). In particular, the use of some developed psychological skills in practice and competition was found to be related to higher levels of mental toughness among athletes. For instance, self-talk, emotional regulation, relaxation (Crust & Azadi, 2010), and imagery use (Mattie & Munroe-Chandler, 2012) proved to be useful strategies for enhancing mental toughness. Nonetheless, limited attention has been given to the effect of emotion regulation, particularly cognitive strategies, on athletes' mental toughness.

2. Cognitive Emotion Regulation Strategies

Emotions are transversal to any sport's practice and environment. However, they can be functional or dysfunctional to the athlete that is experiencing them (Jones, 2003). For example, feeling anxious before a competition may increase activation and motivation for some athletes; while, for others, it may lead to anxiety somatic symptoms, like muscular tension and high levels of arousal, reducing attentional focus and impairing working memory (Jones, 2003; Lane et al., 2011). Thus, athletes should be able to manage their emotional states and employ emotional regulation strategies, in order to attain the desired emotions and consequently improve their sport results (Gucciardi et al., 2008; Jones, 2003; Lane et al., 2011).

Emotion regulation includes a set of intrinsic and extrinsic heterogeneous processes (Gross & Thompson, 2007), that can be broadly classified as antecedent-focused and response-focused (Gross, 2001). Antecedent-focused regulation refers to what we do during a potentially emotion-eliciting situation to manage its emotional impact, whereas response-focused regulation includes what we do after the emotion expressive tendencies have been triggered, in order to modulate our response (Gross & Thompson, 2007). Taking concrete examples of these types of regulation: when an athlete loses a game (emotion-eliciting situation), he/she can think of this situation as being a warning about the technical aspects she/he needs to improve (antecedent-focused regulation); instead, he/she can become frustrated and angry (emotion expressive tendencies) and miss the next practice (response-focused regulation). The first option, which is a cognitive positive reappraisal

strategy, will reduce both experience and behavioral emotion expressions, while the second option, being an experiential avoidance strategy, will only decrease behavioral expression, failing to reduce the experience of negative emotions (Gross, 2001).

Therefore, many paths can be followed in order to regulate emotions. However, some paths are more adaptive than others, in a way that they originate more beneficial consequences for the individual. Regarding this, Wang et al. (2021) established a process model of emotion regulation that includes two contrasting cycles: (a) a “virtuous cycle”, in which cognitive reappraisal promotes positive emotions that, in turn, improve adaptive behavior; (b) and a “negative cycle”, in which expressive suppression leads to negative emotions that, in turn, suspend the behavior and result in experiential avoidance. The authors concluded that, besides the behavioral consequences of each cycle, there are also repercussions in terms of mental toughness. Hence, mental toughness is thought to increase in the “virtuous cycle”, alongside adaptive behavior, and to decrease in the “negative cycle”, alongside behavioral suppression (Wang et al., 2010). This finding was replicated by Mutz et al. (2017), who verified that mental toughness correlates positively with the use of cognitive reappraisal and negatively with the use of expressive suppression.

Although cognitive reappraisal appears to be the most studied adaptive emotion regulation strategy, there are other adaptive ways to regulate emotions through cognition, that likely increase mental toughness. Research showed that mentally tough individuals reported to use (a) refocusing strategies, which involve focusing on the next goal or task, instead of being concentrated on a previous success or failure (Crust et al. 2014), as well as (b) planning strategies, which require compartmentalizing thoughts to allow a strategic plan to be formulated (Kaiseler et al., 2009; Swann et al., 2016). On contrary, there are also maladaptive cognitive emotion regulation strategies, which relate to low levels of mental toughness. Less mentally tough individuals often reported to use strategies involving self-blame (Kaiseler et al., 2009) and blaming others (Swann et al., 2016). These strategies considered maladaptive both imply an attribution of blame, but the objects of blame are different. All cognitive strategies referred so far, besides varying in reference to their degree of adaptability, they also vary concerning content of the thoughts, amount of cognitive activity required, and prevalence (Garnefski & Kraaij, 2007). Regarding prevalence, Garnefski and Kraaij (2007) found that the cognitive strategies considered adaptive were reportedly used more often than the strategies considered maladaptive.

3. Present Study

Hereupon, despite some research of isolated cognitive emotion regulation strategies and their relationship with mental toughness, no study compared the predictive role of a set of cognitive emotion regulation strategies in athletes' mental toughness or examined intra-individual differences in these variables. This was the main goal of the current study, in which we examined: (a) the existence of intra-individual differences between the use of cognitive emotion regulations strategies; (b) the existence of intra-individual differences between the development levels of mental toughness factors; (c) the degree to which athletes' mental toughness is predicted by their ability to regulate emotions using cognitive processes. For that, we asked 162 athletes of various sports, aged between 18 to 35 years, to complete instruments measuring cognitive emotion regulations strategies and mental toughness.

The study was guided by the following research questions: *Do athletes differ in the degree to which they use cognitive emotion regulation strategies? Do athletes present different development levels of mental toughness factors? Is mental toughness predicted by the use of cognitive emotion regulation strategies?*

Based on the previously reviewed literature, the succeeding hypotheses were put forward:

H1: Adaptive cognitive emotion regulation strategies are more frequently used, and they positively predict mental toughness.

H2: Maladaptive cognitive emotion regulation strategies are less frequently used, and they negatively predict mental toughness.

No hypotheses were advanced for intra-individual differences in mental toughness factors, given the exploratory nature of this goal. To date, no study analyzed whether some mental toughness dimensions are more or less developed than others.

Method

1. Participants

A total of 176 individuals responded to our questionnaire. However, 14 participants were excluded for not meeting inclusion criteria. Specifically, to be included in the study, the athletes had to practice the same sport for at least two years in a club, apart from satisfying the established age criteria (18 to 35 years). Therefore, 162 athletes aged between 18 to 34 years old ($M = 20.76$, $SD = 3.63$) participated in the current study, 81.5% of which were university students. Excepting one Brazilian participant, all others were Portuguese. Participants included 93 female and 69 male athletes from a variety of team and individual sports: volleyball (15.4%), martial arts (11.1%), football (9.9%), basketball (8.6%), athletics (7.4%), swimming (6.2%), tennis (5.6%), futsal (4.3%), dance (4.3%), handball (4.3%), water polo (3.1%), badminton (2.5%), equestrianism (2.5%), rugby (2.5%), rowing (2.5%), crossfit (1.2%), figure skating (1.2%), table tennis (1.2%), acrobatic gymnastics (0.6%), artistic gymnastics (0.6%), a American football (0.6%), canoeing (0.6%), chess (0.6%), cycling (0.6%), motorsport (0.6%), mountain biking (0.6%), roller hockey (0.6%) and shooting with hunting weapons (0.6%). To summarize, half of the participants practiced a team sport, while the other half practiced an individual sport.

This sample was composed by professional (6.8%), semiprofessional (34.0%) and amateur athletes (59.2%). Only 4.9% of the participants have never participated in a competition, meaning that their majority had a moderate-to-high competition experience. On average, athletes practiced their sport for 9.55 years ($SD = 4.47$) and trained approximately 7.06 ($SD = 5.05$) hours per week in the last 6 months. Almost all participants (i.e., 89.9%) did not have psychological support at their club.

2. Measures

2.1. Cognitive Emotion Regulation

To evaluate the use of cognitive emotion regulation strategies in response to negative events, we resorted to the Portuguese version of Cognitive Emotional Regulation Questionnaire (CERQ; Castro et al., 2013), originally developed by Garnefski et al. (2001).

This is a multidimensional questionnaire that includes 36 items to be answered on a 5-point Likert scale ranging from 1 (*almost never*) to 5 (*almost always*).

The original version has nine factors, but the Portuguese CERQ presents only eight: Positive reappraisal and planning (creating a positive meaning for the negative event and also thinking about what can be done to handle it; e.g., *I think that the situation also has its positive sides; I think about how to change the situation*), Positive refocusing (pleasant thoughts instead of thinking about the current event; e.g., *I think of pleasant things that have nothing to do with it*), Putting into perspective (thoughts of keeping aside the seriousness of the event or relativize it when compared to other events; e.g., *I think that it all could have been much worse*), Acceptance (conformism to what has been experienced; e.g., *I think that I must learn to live with it*), Rumination (thoughts about feelings and/or beliefs associated with the negative event; e.g., *I often think about how I feel about what I have experienced*), Self-blame (thoughts in which the athlete blames himself/herself for the experience; e.g., *I think that basically the cause must lie within myself*), Blaming others (thoughts in which the attribution of blame goes to something external; e.g., *I feel that others are to blame for it*), and Catastrophizing (thoughts that accentuate the experienced terror; e.g., *I continually think how horrible the situation has been*).

The Portuguese CERQ was found to have a very good internal consistency ($\alpha = .89$ for the whole scale; with all factor values ranging between .70 and .89) as well as a high test-retest reliability ($r = .58, p < .001$) (Castro et al., 2013). In the current study, Cronbach's alpha was .90 for Positive reappraisal and planning, .79 for Positive refocusing, .74 for Rumination, .76 for Blaming others, .74 for Putting into perspective, .80 for Self-blame, .72 for Acceptance, and .78 for Catastrophizing.

2.2. Mental Toughness

To measure athlete's mental toughness, we used the Portuguese version of the Sports Mental Toughness Questionnaire (SMTQ; Fonseca & Rosado, 2012), originally designed by Sheard et al. (2009). This is a multidimensional questionnaire with 14 items to be answered in a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). It should be noted that 2 items were excluded in a preliminary validation of the Portuguese SMTQ, due to their inadequate factorial weight. However, we chose to use the original version of the Portuguese SMTQ with 14 items, instead of the preliminary validation (12 items), because of the unsatisfactory psychometric properties of the last one.

Besides assessing global mental toughness, SMTQ also individually assesses Constancy (4 items; e.g., *I am committed to completing the tasks I have to do; I get distracted easily and lose my concentration*), Confidence (6 items; e.g., *I can regain my composure if I have momentarily lost it; I have qualities that set me apart from other competitors*), and Control (4 items; e.g., *I get anxious by events I did not expect or cannot control; I am overcome by self-doubt*).

Internal consistency of the Portuguese SMTQ, measured through composite reliability, was .60 for Control, .66 for Constancy, and .78 for Confidence (Fonseca & Rosado, 2012). Regarding the questionnaire's validity, both convergent and discriminant values are less than desirable. However, the global model shows a good adjustment to evaluate mental toughness as a global factor (Fonseca & Rosado, 2012). In the current study, Cronbach's alpha was .63 for Constancy, .75 for Confidence, .59 for Control, and .79 for the Global score.

3. Procedures

The study was implemented online through *LimeSurvey* software. The questionnaire's link was provided directly to several clubs and it was also posted on social media, in order to reach as many athletes as possible. After a clarification of the purpose, implications and ethical matters of the study, participants were asked to consent their involvement using a click-if-you-agree system. Then, they completed the questionnaire organized in three sections: sociodemographic information, cognitive emotion regulation scale and mental toughness questionnaire. The study was approved by the university Ethics Committee (ref. 2021/05-06).

3.1. Data Analyses

We used the IBM SPSS Statistics version 26 to conduct our statistical analyses, which followed four main steps.

First, we explored the descriptive statistics of all variables, including minimum and maximum values, means and standard deviations. We also inspected the skewness and kurtosis values for each variable, to evaluate the degree to which our data deviated from the normal distribution, using [-2; 2] as a cut-off point (George & Mallery, 2010).

Second, we examined the relationship between all constructs, by analyzing a correlation matrix with all variables. This step provided us with an initial overview of the links between our variables, and the adequacy of moving forward to the regression analyses (cf. step 4).

Third, we conducted two repeated-measures analyses of variance (ANOVAs). One to compare the mean values of each cognitive emotion regulation strategy and the other to compare the mean values of the mental toughness factors. We used an alpha level of .05 and followed up significant main effects with pairwise comparisons with Bonferroni correction. Before conducting these analyses, we verified the sphericity assumption through the Mauchly's test and resorted to the Greenhouse-Geisser correction, in case the assumption was not validated.

Finally, we conducted a set of multiple linear regressions. One for each dimension of mental toughness (i.e., confidence, control and constancy) and another for the global score, to find the relative weight of each cognitive emotion regulation strategy on mental toughness. We tested the following assumptions for all analyses: independence of residuals, multicollinearity and existence of outliers. For the independence of residuals assumption to be met, the Durbin-Watson test values should fit within the recommended limit of [1.5, 2.5] (Field, 2009). For the multicollinearity principle to be confirmed, no values of Variance Inflation Factor (VIF) should be above 2.5 (Johnston et al., 2018). For the nonexistence of outliers, the residual values should fit the interval of [-3, 3] (Field, 2009).

Results

An analysis of the descriptive statistics showed that the data had no large deviations from the normal distribution. As can be seen in Table 1, skewness and kurtosis values of all variables were within the recommended limit of $-/+ 2$.

Table 1

Descriptive Statistics of all Variables

	Min.	Max.	<i>M</i>	<i>SD</i>	<i>Sk</i>	<i>Ku</i>
Cognitive Emotion Regulation Strategies						
Positive reappraisal and planning	1.57	5.00	3.48	0.89	-0.06	-0.92
Positive refocusing	1.00	5.00	2.63	0.84	0.26	-0.42
Putting into perspective	1.25	5.00	2.86	0.92	0.23	-0.8
Acceptance	1.25	5.00	3.10	0.84	0.19	-0.62
Rumination	1.20	5.00	3.07	0.83	0.12	-0.45
Blaming others	1.00	3.75	1.67	0.59	0.95	0.56
Self-blame	1.00	4.67	2.29	0.82	0.69	-0.08
Catastrophizing	1.00	4.25	1.79	0.77	1.14	0.71
Mental Toughness						
Confidence	1.67	4.00	2.77	0.58	0.11	-0.90
Control	1.00	3.75	1.96	0.58	0.56	0.17
Constancy	2.00	4.00	3.35	0.53	-0.64	-0.46
Global Score	1.71	3.86	2.71	0.44	0.03	-0.60

The correlation analyses are shown in Table 2. Overall, results revealed that the adaptive cognitive emotion regulation strategies (positive reappraisal and planning, positive refocusing, putting into perspective and acceptance) shared a positive correlation among them ($.26 < r_s < .52$). The maladaptive strategies (rumination, blaming others, self-blame and catastrophizing) also were positively correlated between them ($.43 < r_s < .54$).

Table 2*Bivariate Correlations Between all Constructs*

	1	2	3	4	5	6	7	8	9	10	11
Cognitive Emotion Regulation Strategies											
1. Positive reappraisal and planning											
2. Positive refocusing	.52**										
3. Putting into perspective	.39**	.35**									
4. Acceptance	.12	.13	.26*								
5. Rumination	-.10	-.14	.11	.23*							
6. Blaming others	-.10	.09	-.03	.02	.14						
7. Self-blame	-.22*	-.28**	-.01	.09	.45**	.12					
8. Catastrophizing	-.41**	-.21*	.02	.05	.48**	.43**	.54**				
Mental Toughness											
9. Confidence	.59**	.32**	.06	-.02	-.22*	.03	-.22*	-.23*			
10. Control	.28**	.26*	-.02	-.02	-.48**	-.11	-.36**	-.35**	.35**		
11. Constancy	.50**	.14	-.10	.06	-.05	-.13	-.15	-.30**	.54**	.23*	
12. Global score	.61**	.32**	-.01	.01	-.32**	-.07	-.31**	-.37**	.88**	.66**	.73**

Note. * $p < .01$. ** $p < .001$

Most of the adaptive cognitive emotion regulation strategies were negatively correlated with the maladaptive strategies ($-.21 < r_s < -.41$), excepting acceptance, which was positively correlated with rumination ($r = .23$).

Mental toughness factors (confidence, control and constancy) and the global score shared positive correlations between them ($.23 < r_s < .88$), and also shared positive correlations with the adaptive cognitive emotion regulation strategies ($.26 < r_s < .61$). On contrary, the factors and global score of mental toughness were negatively correlated with the maladaptive cognitive emotion regulation strategies ($-.22 < r_s < -.48$).

1. Intra-Individual Differences

The comparisons of the cognitive emotion regulation strategies revealed differences in their prevalence, $F(4.28, 689.20) = 112.26, p < .001, \eta_p^2 = .41$. As indicated in Table 1, the prevalence of the strategies, in descending order, was the following: positive reappraisal and planning, acceptance, rumination, putting into perspective, positive refocusing, self-blame, catastrophizing and blaming others. There were significant differences between all strategies, except between acceptance, rumination, putting into perspective and positive refocusing, as well as catastrophizing and blaming others.

The comparisons of the mental toughness' factors showed that they all had different levels of development, $F(1.85, 297.00) = 395.97, p < .001, \eta_p^2 = .71$. As can be seen in Table 1, the descending order of the factors' development was constancy, confidence and control. All mental toughness' factors had mean values significantly different from each other.

2. Predictors of Mental Toughness

The assumptions of independence of residuals ($1.88 < d < 2.10$) and multicollinearity ($VIF < 2.28$) were both met. Regarding the existence of outliers, one was identified on a regression analysis. However, it was kept throughout the procedure because its presence did not significantly affect the results.

The regressions analyses showed that all the factors of mental toughness were significantly predicted by cognitive emotion regulation strategies. The cognitive emotion regulation strategies explained 42% of the variance of the confidence factor, $F(8, 153) =$

14.10, $p < .001$, $R^2 = .42$; 32% of the control factor, $F(8, 153) = 8.76$, $p < .001$, $R^2 = .32$; 38% of the constancy factor, $F(8, 153) = 11.46$, $p < .001$, $R^2 = .38$; and 51% of the mental toughness global score, $F(8, 153) = 19.61$, $p < .001$, $R^2 = .51$.

Table 3

Regression Analyses of the Contribution of Cognitive Emotion Regulation Strategies to Confidence

	B	SE	β	t	p
Positive reappraisal and planning	0.46	0.05	.70	8.57	< .001
Positive refocusing	0.00	0.05	.01	0.06	.95
Putting into perspective	-0.12	0.05	-.20	-2.76	.01
Acceptance	-0.01	0.05	-.01	-0.19	.85
Rumination	-0.12	0.05	-.18	-2.39	.02
Blaming others	0.06	0.07	.06	0.82	.42
Self-blame	-0.05	0.05	-.07	-0.92	.36
Catastrophizing	0.12	0.07	.16	1.70	.09

Note. B = unstandardized coefficient; β = standardized coefficient

As can be seen in Table 3, the cognitive emotion regulation strategies that significantly predicted confidence were positive reappraisal and planning ($\beta = .70$, $p < .001$), putting into perspective ($\beta = -.20$, $p = .01$) and rumination ($\beta = -.18$, $p = .02$). The strategy with the highest predictive value was positive reappraisal and planning.

As displayed in Table 4, only positive reappraisal and planning ($\beta = .20$, $p = .02$) and rumination ($\beta = -.40$, $p < .001$) were significant predictors of control, with rumination having a higher predictive value than positive reappraisal and planning.

Table 4

Regression Analyses of the Contribution of Cognitive Emotion Regulation Strategies to Control

	B	SE	β	<i>t</i>	<i>p</i>
Positive reappraisal and planning	0.13	0.06	.20	2.28	.02
Positive refocusing	0.07	0.06	.10	1.19	.24
Putting into perspective	-0.07	0.05	-.11	-1.42	.16
Acceptance	0.06	0.05	.08	1.12	.26
Rumination	-0.28	0.06	-.40	-4.92	< .001
Blaming others	-0.05	0.08	-.05	-0.60	.55
Self-blame	-0.09	0.06	-.13	-1.56	.12
Catastrophizing	0.03	0.08	.04	0.38	.70

Note. B = unstandardized coefficient; β = standardized coefficient

Table 5

Regression Analyses of the Contribution of Cognitive Emotion Regulation Strategies to Constancy

	B	SE	β	<i>t</i>	<i>p</i>
Positive reappraisal and planning	0.38	0.05	.65	7.63	< .001
Positive refocusing	-0.06	0.05	-.09	-1.17	.24
Putting into perspective	-0.20	0.04	-.35	-4.76	< .001
Acceptance	0.05	0.04	.08	1.10	.27
Rumination	0.04	0.05	.07	0.85	.40
Blaming others	-0.05	0.07	-.06	-0.84	.40
Self-blame	-0.03	0.05	.05	-0.58	.57
Catastrophizing	-0.02	0.07	-.03	-0.34	.73

Note. B = unstandardized coefficient; β = standardized coefficient

As shown in Table 5, positive reappraisal and planning ($\beta = .65, p < .001$), and putting into perspective ($\beta = -.35, p < .001$) were the strategies that significantly predicted constancy, with positive reappraisal and planning having the highest predictive value.

Table 6

Regression Analyses of the Contribution of Cognitive Emotion Regulation Strategies to Mental Toughness Global Score

	B	SE	β	t	p
Positive reappraisal and planning	0.34	0.04	.70	9.20	< .001
Positive refocusing	0.00	0.04	.01	0.12	.91
Putting into perspective	-0.13	0.03	-.28	-4.16	< .001
Acceptance	0.03	0.03	.05	0.81	.42
Rumination	-0.12	0.04	-.23	-3.33	0.001
Blaming others	-0.00	0.05	-.01	-0.09	.93
Self-blame	-0.05	0.04	-.11	-1.48	.14
Catastrophizing	0.05	0.05	.09	1.08	.28

Note. B = unstandardized coefficient; β = standardized coefficient

As shown in Table 6, the strategies that significantly predicted MT global score were positive reappraisal and planning ($\beta = .70, p < .001$), putting into perspective ($\beta = -.28, p < .001$) and rumination ($\beta = -.23, p = .001$). The strategy with the highest predictive value was positive reappraisal and planning.

Discussion

The current study explored the relationship between athletes' mental toughness and their ability to regulate emotions using cognitive strategies. In what follows, we discuss the main findings concerning the variables correlational pattern, intra-individual differences among cognitive emotion regulation strategies, contribution of the cognitive strategies to mental toughness and intra-individual differences among mental toughness' factors.

In respect of correlations, we found positive associations between the adaptive cognitive emotion regulation strategies, as well as between the maladaptive cognitive emotion regulation strategies. We also found most of the adaptive strategies to be negatively correlated with the maladaptive strategies. These findings are in line with Garnefski and Kraaij (2001), who divided cognitive emotion regulation strategies into two contrasting groups, according to the degree to which they promote the individual's adjustment. Further, adaptive strategies, mainly positive reappraisal and planning, correlated positively with mental toughness, as already reported by Kaiseler et al. (2009) and Mutz et al. (2017). In contrast, maladaptive strategies correlated negatively with mental toughness. With this regard, Kaiseler et al. (2009) found a negative relationship between the specific strategy of self-blame and mental toughness. It is important to notice that the CERQ had been applied to a variety of populations, such as breast cancer women (Li et al., 2015), fibromyalgia syndrome patients (Feliu-Soler et al., 2017) and infertile women (Foroudifard et al., 2020), but it had not yet been used with athletes. Thus, our results suggest that (a) the CERQ is a suitable instrument for the athlete's population, (b) the athletes with high levels of mental toughness use adaptive cognitive strategies more often, whereas (c) the athletes with low levels of mental toughness use maladaptive cognitive strategies more frequently.

Although the correlational pattern was aligned with our expectations, there was a surprising positive association between acceptance and rumination. This association was not expected because these strategies are considered adaptive and maladaptive, respectively (Garnefski & Kraaij, 2001). However, we were able to locate one study that reported similar findings. Foroudifard et al. (2020) suggested that acceptance is not a naturally adaptive strategy, instead, its adaptability depends on the circumstances. In line with this claim, Wilson (1996) proposed that acceptance can either be an active or a passive strategy. As an active strategy, acceptance is a dynamic process in which the

individual stops focusing on the negative implications of a situation that cannot be changed and, alternatively, accepts the facts in a more positive perspective. On contrary, acceptance as a passive strategy reduces to resignation to an undesired fate, leading the individual to surrender to negative experiences (Wilson, 1996). Therefore, it seems probable that the construct measured through the acceptance subscale was the passive acceptance, rather than the active acceptance. This would explain its positive link with rumination.

Concerning the use of cognitive emotion regulation strategies, we confirmed that athletes generally reported to use adaptive strategies more frequently than maladaptive strategies. This result, already found by Garnefski and Kraaij (2007), is encouraging because the use of adaptive or maladaptive strategies seems to have different roles on mental health. When compared to individuals who use adaptive strategies, those who adopt theoretically maladaptive strategies have generally reported more depression and anxiety symptoms (Garnefski et al., 2001), as well as worse subjective and psychological well-being (Balzarotti et al., 2014). It should however be noted that, in our research, rumination was reported to be used to the same extent as some adaptive strategies. This finding suggests that many athletes used rumination as an emotion regulation strategy. From an applied viewpoint, this is a problematic result, given the association of this kind of strategy with several maladaptive symptoms, as described above.

The cognitive strategy that athletes most resorted to was positive reappraisal and planning. This adaptive strategy was also the strongest predictor of global mental toughness ($\beta = .70$). Additionally, it was the only cognitive strategy that significantly predicted all mental toughness' factors. Positive reappraisal and planning emerged in the research of Castro et al. (2013) as being a result of the combination of two initially distinct strategies – positive reappraisal and refocus on planning (Garnefski & Kraaij, 2007). Hence, this CERQ subscale included all items of the positive reappraisal original scale and the majority of the refocus on planning scale (Castro et al., 2013).

Refocus on planning implies rethinking what steps can we take to improve the adverse situation (Garnefski et al., 2001, 2007). It is considered an adaptive strategy (Garnefski & Kraaij, 2007) and a positive predictor of mental toughness (Kaiseler et al., 2009). In turn, positive reappraisal refers to reconstruing an emotion-eliciting situation, by modifying our initial evaluation, so that we alter its emotional impact (Gross, 1999; Ray et al., 2008). Individuals who used this strategy showed personal growth (Garnefski & Kraaij, 2007), along with flexibility and positivity in their actions and thoughts (Li & Wu, 2011). They were able to reinterpret undesirable events as less intensely negative, as well as to

maintain confidence and positive expectations throughout stressful situations (Li & Wu, 2011; Ray et al., 2008). Previous research already related positive reappraisal with enhanced optimism (Li & Wu, 2011), as well as with reduced depressive and anxiety symptoms (Garnefski et al., 2002), which are characteristics of mentally tough athletes (Sheard et al., 2009).

Hereupon, as likely expected for such a beneficial adaptive strategy, positive reappraisal and planning positively predicted mental toughness. Although this cognitive strategy was the only positive predictor of mental toughness, two other strategies appeared as negative predictors: putting into perspective ($\beta = -.28$) and rumination ($\beta = -.23$). Rumination, also called focus on thought (Garnefski et al., 2001, 2005), is characterized by a repetitive self-focused attention to our moods, as well as to the causes and implications of those moods (Garnefski et al., 2001; Nolen-Hoeksema & Morrow, 1991). Individuals who ruminate show a sense of certainty that situations in their life are out of control, which translates into a tendency to avoid taking action and responsibility (Nolen-Hoeksema et al., 2008). Physiologically, they appear to reactivate the arousing properties of events that make them distressed (Ray et al., 2008). Hence, contrary to positive reappraisal, frequent use of rumination was associated with several negative consequences, namely, negative mood, symptoms of PTSD, depression and anxiety (Garnefski et al., 2002; Nolen-Hoeksema & Morrow, 1991).

Even though we expected greater use of rumination to be associated with less mental toughness, once it belongs to the theoretical cluster of maladaptive strategies, we were not expecting putting into perspective to be a negative predictor. This strategy consists in downgrading the importance of the adverse event, mostly by comparing it with others (Garnefski et al., 2001, 2007). Just like positive reappraisal, putting into perspective is considered an adaptive cognitive strategy that implies changing the appraisal of the situation (Garnefski et al., 2007). As much as the use of both strategies require the individual to reappraise the situation, this is done from contrasting viewpoints. Positive reappraisal involves an “active perspective from a positive side”, whereas putting into perspective involves a “lower comparative perspective” (Oikawa et al., 2017). This contrast may explain our results, since an active perspective, which promotes personal growth, seems to be more adaptive than a comparative perspective. In other words, it appears that positive reappraisal is a more adaptive strategy than putting into perspective.

In this line, Garnefski et al. (2003) and Schroevers et al. (2007) found a positive relationship between putting into perspective and depressive symptomatology. In fact,

Garnefski et al. (2003) verified that, along with self-blame, rumination and catastrophizing, putting into perspective was a significant predictor of depressive symptoms. Hence, just like we previously concluded for acceptance, putting into perspective should not always be considered an adaptive cognitive strategy (Garnefski et al., 2003). Instead, in some conditions, thinking that “it hasn’t been too bad compared to other things” or that “other people go through much worse experiences” can produce maladaptive results for athletes. Therefore, it is worth noting that several results of this study raise doubts about the categorization of strategies in adaptive and maladaptive group, proposed by Garnefski et al. (2001, 2007). Thus, we suggest that athletes should attend to the particularities of each situation they encounter in their sports trajectory, and only then choose the cognitive strategy most suited to it.

In respect to mental toughness, we concluded that constancy was the most developed factor, followed by confidence and then control. These results suggest that a special attention should be given to control, once it is the least improved from the three factors. The control factor in SMTQ refers to the perception that we are responsible and influential, rather than passive, and can achieve desired outcomes (Crust & Swann, 2011; Fonseca & Rosado, 2012; Sheard & Golby, 2010). In other words, despite the adversities we run into, we believe we have control over our life events and emotions (Fonseca & Rosado, 2012; Sheard & Golby, 2010). Thus, athletes with a high level of control development are able to maintain focused on their sports’ goals in the face of physical or emotional distress and uncontrollable or unexpected events (Chen & Cheesman, 2013).

Although we did not have any hypothesis for this topic, control being the least developed factor was an interesting finding. When analyzing the contribution of cognitive emotion regulation strategies to this factor, rumination and positive reappraisal and planning appeared as significant predictors. However, rumination stood out with the highest predictive value ($\beta = -.40$), leading control to be the only mental toughness factor in which positive reappraisal and planning was not the strongest predictor. These results reinforced past findings, which reported a connection between rumination and lack of control (Nolen-Hoeksema et al., 2008; Kircanski et al., 2015). Ruminators create evidence that they can neither take control of the situation nor overcome it. Hence, they believe that all their efforts are fruitless, which actually may be less aversive than not being sure about their ability to control the situation (Nolen-Hoeksema et al., 2008). Most of the times, this cognitive pattern of rumination starts automatically, without conscious awareness, being therefore considered a maladaptive habit of thought (Hertel, 2004).

1. Limitations

When interpreting the findings of the present study, three main limitations should be considered. Firstly, SMTQ appears to combine different components of mental toughness into just three factors. Particularly, the constancy factor seems to include items related to challenge, commitment and attention (Crust & Swann, 2011; Fonseca & Rosado, 2012). Secondly, the Portuguese SMTQ shows relatively weak psychometric properties, mostly regarding its validity. In the future, more research testing the validity of this instrument seems warranted. Thirdly, relationships between mental toughness factors and emotion regulation cognitive strategies were analyzed at a single period through cross-sectional regressions. Thus, the current findings do not sustain causal inferences. Future longitudinal research is needed to replicate our results.

2. Practical Implications

Several practical implications can be inferred from this study. Considering that control was the least developed factor and that rumination, besides being one of the most used cognitive strategies, was the main strategy linked to low control, it seems important for athletes to reduce rumination's use. To contradict the maladaptive habit of rumination, athletes may need to create new habits of thought, through repeated practice of controlled responses (Hertel, 2004). Based on our findings, we suggest that positive reappraisal and planning may be a new habit of thought to help athletes in developing their sense of control. This adaptive habit appears to be related to improvements on all mental toughness factors, which indicates this is an important cognitive strategy that should be trained and frequently used by athletes.

The *Cognitive Emotion Regulation Questionnaire* appears to be adequate for assessing which cognitive emotion regulation strategies athletes most and least resort to. Then, psychological skills training programs seems an efficient method for athletes to counteract the identified weaknesses (e.g., rumination as a habit of thought), develop adaptive emotion regulation strategies (e.g., positive reappraisal and planning) and mental toughness in general (Golby & Wood, 2016; Jones et al., 2007; Sheard et al., 2009). Moreover, Lane et al. (2011) stated that the gains in sports are also expanded to the athletes' daily life. In other words, the enhanced capacity to regulate emotions through

cognitive processes in sports events, linked to increased levels of mental toughness, will probably translate into these same abilities in life situations. Hence, we propose that psychological assessment and mental training should not be disregarded in sports. Rather, they should be active tools implemented by qualified professionals to achieve desired outcomes.

Conclusion

In sum, this research emphasized the relevance of psychological factors and strategies in the sport's context. By developing cognitive emotion regulation strategies, especially positive reappraisal and planning, the athletes may achieve greater levels of mental toughness, and likely superior performance results (Gucciardi, 2008). We believe this should be one of the key goals to be targeted by sports psychologists.

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