Research Paper: Psychometric Properties of the Positive Meta-Cognitions and Meta-Emotions Questionnaire in Iranian athletes

Zahedeh Rahmanian[1*], Mohammad Vaez Mousavi[2]

1- Lecturer and Research Expert, Department of Humanity Sciences, School of Psychology, Pardis-e-Kosar, Farhangian University, Kohkiloye & Boyerahmad, Iran.
2- Department of Physical Education and Sport Sciences, School of Motor Behavior and Sport Psychology, Imam Hossein University, Tehran, Iran.

Use your device to scan and read the article online

Citation Rahmanian Z, Vaez Mousavi M. Psychometric Properties of the Positive Meta-Cognitions and Meta-Emotions Questionnaire in Iranian athletes. Journal of Research & Health. 2019; 9(7):588-597. http://dx.doi.org/10.32598/JRH.1032.1

http://dx.doi.org/10.32598/JRH.1032.1

Article info:
Received: 4 Nov 2017
Accepted: 21 Apr 2018
Publish: 01 Nov 2019

Keywords:
Physical Activity, Sport, Meta-Cognition, Meta-Emotion, Factor Analysis

ABSTRACT

Background: Meta-cognition refers to self-knowledge, control and monitoring of one's thinking and emotional processes, such a meta-cognition, and meta-emotion which is consisted of: a) confidence in extinguishing perseverative thoughts and emotions; b) confidence in interpreting own emotions as cues, restraining from immediate reaction and mind-setting for problem-solving; c) confidence in setting flexible and feasible hierarchies of goals. This study aimed to determine the psychometric properties of the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) in athletes.

Methods: The sample consisted of 307 men and women athletes of 8 sport clubs in Jahrom city which were selected by cluster random sampling. The factor analyses showed the presence of a three-dimensional structure of PMCEQ which determine 47.24% of total variance explained of metacognition.

Results: The positive meta-cognition differences were found based on gender, age, duration, and types of physical activities. There were significant correlations between PMCEQ and Metacognition Questionnaire-30, Sport Self-regulation, and Goal Orientation Questionnaires. Data were indicative of the acceptable level of Cronbach's alpha (0.83) and split-half (0.86) reliability coefficients of positive meta-cognition and meta-emotion questionnaire totally.

Conclusion: The results of the present study indicated substantial adequacy of this questionnaire to measure positive meta-cognition and meta-emotion in the domain of sport and physical activities.

*** Corresponding Author:**
Zahedeh Rahmanian, PhD.
Address: *Lecturer and Research Expert, Department of Humanity Sciences, School of Psychology, Pardis-e-Kosar, Farhangian University, Kohkiloye & Boyerahmad, Iran.*
Phone: *+98 (917) 7911529*
E-mail: *zr7911529@chmail.ir*

Introduction

Meta-cognition is a self-regulatory sequence of related processes that extinguish persevering thoughts and emotions in challenges (e.g., an athlete knows when national championship failures, he / she tends to breed and dwell on negative thoughts), interpreting one's own emotions as indicators preventing from immediate reaction and mind-setting for problem-solving (e.g., players tend to rationally evaluate unpredictable situations rather than getting anxious in competition), and setting flexible and realistic goal hierarchies (e.g., when a problem appears to be insurmountable, athletes know it's just a matter of breaking it down into smaller problems). Such meta-cognitions usually identify positive meta-cognition and meta-emotion such as below and perseverative self-regulatory executive function and in the following of changing metacognition processes of problem focus to solving the task or problem at hand [1]. From the most relevant theories, it could be referred to Wells and Matthews' Self-Regulatory Executive Function (S-REF) model and Wells' metacognitive model of emotional disorders [2-5] propose that the core online-controlled processing level (at which meta-cognitive self-regulation takes place by appraising events and utilizing meta-cognitive control strategies) comprises the core S-REF taking place at the conscious level and hence being fundamental for the individual's self-awareness. This level comprises the core S-REF with a bidirectional relationship to the schema level (which stores self-beliefs and knowledge in long-term memory) that inform the S-REF and self-beliefs (monitoring) by selecting generic plans (control) [5]. Wells and Matthews have proposed that one could work independently before a problem situation in two ways: "Object Mode" and "Metacognitive Mode." In object mode, distressing thoughts are considered (threatening) facts whereas when working in a metacognitive mode, a person interprets such thoughts as events or cues that need to be analyzed afterward [2-3]. Object mode has been theorized to be functional only in genuinely threatening situations and to be dysfunctional in all other situations because it fosters persevering thought and therefore dealing with maladaptation. According to the assumption theory by following a sequential regulatory process, both modes can change obstacles to achieving or goal-achievement in an appropriate situation. In addition, simple and independent metacognitive beliefs are important for the use of adaptive objects and metacognitive modes, and then alternative approaches and flexible goal-setting need to be established. It is also suggested that such a metacognition requires the adaptive or positive meta-emotions in emotional reactions to one's own emotions [6]. According to Neff' s meta-emotional theory, examples of adaptive or positive meta-emotions (include joy, compassion, curiosity and interest) reflect and support one's own emotions with potentially well-being-enhancing effects, as meta-emotions provide to an accepting stance towards one's own emotions so it means that an initially positive meta-emotion can explain psychological processes of mindfulness/acceptance that maintain well-being [7]. Cognitive appraisal theories of emotions suggest that emotions are the direct result of evaluation or appraisal processes [8]. There would be no scope to take into account emotions and meta-emotions if this definition were true In contrast to the outlined appraisal theories, Jäger and Bartsch argued that emotions incorporate phenomenal qualities and that judgments involved in cognitions are neither necessary nor sufficient for experiencing certain emotion [9].

The first component targets a core structure of the theory of Wells and Matthews and Wells and could reflect an inverse maladaptive metacognitive trait [2,3,5]. The second component seems to capture meta-emotions that promote emotional intelligence, and particularly what Goleman described as "a neutral mode which maintains self-reflectivity even among turbulent emotions" [10, p.47]. The third component seems to identify metacognitions that support a type of self-regulation defined by Zimmerman as a systematic effort to direct cognitions, emotions, and actions towards the achievement of one's goal. The three components conjointly seem to describe metacognitive and meta-emotional self-regulatory styles that support the flexible and resilient target behavior exhibited by individuals that Self¬-Determination Theory [12] depicts as being high in autonomy orientation. In situations or environments that can not be modified easily, these individuals are capable of volitional and flexible accommodation appear to interpret setbacks as informative continue to search for opportunities to achieve their autonomous goals and are less likely to lose intrinsic motivation due to lack of progress [1]. This paper presents the view that regardless of possible overlaps between cognitions and emotions (and between their meta-constructs), there appears to be evidence of at least some emotions and meta-emotions [9] caused by factors other than (purely) cognitive.

Beer's study on a mixed convenience sample of 313 workers and student participants (18-72 years old) to establish and validate a new tool for measuring adaptive metacognitive and meta-emotional self-regulation in response to challenges. The questionnaire of three

factors has been reduced from an initial item pool of 49 to a final 18 items, with each factor consisting of six items. The first factor is faith in extinguishing persevering thoughts and emotions which capture the ability to quickly refrain from rumination and worries in the form of challenging situations and events when faced with stressors. Individuals who score low on this trait claim that after experiencing only minor disturbing thoughts or feelings, they lack the ability to recover equilibrium. As such, the need for micro-monitoring of their internal states and external events is likely to increase. This increases the likelihood that a stressor is mainly considered a threat, even one of low intensity. In turn, the primary threat appraisal should foster maladaptive coping. Secondly, confidence in interpreting one's own emotions as indicators, restraining from immediate reaction and mind-setting for problem-solving, and third component (confidence in setting flexible and feasible goal hierarchies) leverage the ability to correctly perceive and resolve complex stressors through the use of agency flexibility and strategy. People who score low on these traits think they lack the ability to act on a stressor (flexibly or strategically). As such, they are likely to experience increased dissonance between the perceived demands of a challenging or difficult situation and their own ability to cope. Low coping perception increases the likelihood of a stressor being secondarily evaluated as a threat [1].

Psychological factors related to metacognitive and meta-emotional dis-situational symptoms are self-regulation and goal orientation [1]. Theodosiou, Papaioannou's research showed that task-orientation and task-involving motivational environment had a significant impact on self-reported metacognitive behavior in the physical education classes of students (14-17). High-task-oriented students are intrinsically motivated, value the learning process itself, and in physical education develop self-regulatory cognitions and behaviors. During the class, the physical education teacher's motivational environment plays an important role in the metacognitive behavior of the students. Teachers who emphasize competence in their classrooms are more likely to have students in physical education who use metacognitive techniques during studying and practicing. Ego-oriented individuals are more likely to concentrate on success than a deeper understanding of the task and an ego-involving climate does not encourage metacognitive engagement and self-regulation in physical education classes. The metacognitive strategy of evaluation had a positive but weak relationship with ego-orientation and performance-oriented climate . High ego-oriented students' frequent use of cognitive processes involving comparisons between themselves and the others probably predisposes these students to use comparisons and evaluations in their learning process. Both task-orientation and mastery-oriented climate had a unique contribution in the explanation of variance of metacognition [13]. Therefore, these mental processes in athletes, by enhancing their ability to choose and encourage healthy activities throughout the life cycle, reduce the perception of individuals of the challenge of exercise obviously encouraged, contributing to adherence to healthy behaviors such as exercise and sport [14].

The Metacognitions Questionnaire-30 (MCQ-30; Wells and Cartwright – Hatton) would be the most closely related tool to the positive meta-cognitions and meta-emotions questionnaire assessing metacognitions of the opposite, i.e. maladaptive type [15]. At this point, the first-factor confidence in extinguishing persevering thoughts and emotions) touches the core but reversed construct of the S-REF of Wells and Matthews as trust in extinguishing worrying thoughts and depressive rumination, which in turn prevents the S-REF from becoming a hyperactive, inverse and mostly strong correlation with some MCQ-30 subscales. In inverse extension to the MCQ-30, the second and third factors of the positive metacognitions and positive meta-emotions questionnaire (PMCEQ-2 and PMCEQ-3) appear to measure novel psychological and adaptive self-regulatory processes in new areas of cognitive, and in parts also emotional confidence. Therefore, it would be used from the exercise self-regulation questionnaire [12] and goal-orientation questionnaire [16], are similar to PMCEQ-2 and PMCEQ-3 constructs, to analyze the concurrent and predictive validity of PMCEQ.

Evidence has been found in the relationship between metacognition and physical activity that when a person is familiar with a motor skill, the individual is more likely to use either conscious or unconscious metacognitive techniques in various fields of physical activity such as writing, dancing, and tennis [17], or basketball, soccer, and aerobics [13], where there is a disparity between experts and non-experts. As regards physical activities, Ommundsen found that boys used metacognitive /elaboration strategies in physical education settings more frequently than girls. With regard to age, Lee and Chen found that children of different ages (from 9 to 13 years of age) had different levels of metacognitive knowledge in basic motor activities such as running, which is the same for all children, but older children understand and better record sequences of movements while walking[19]. Another study by Sperling and colleagues showed that as children grow up, learning and knowledge as well as strategic pro-

cesses become more specific to the type of physical activity and older children develop more domain-specific metacognition [20].

Positive metacognition and meta-emotion can promote or hinder adaptive self-regulation and mental health due to interpersonal differences. This research focused on an area that could contribute to the development and implementation of strategies to enhance sport quality and healthy cognitive beliefs and positive metacognition and meta-emotion. Because an important step in identifying the necessity and fundamental agent of positive metacognition and meta-emotion is the development of a reliable and valid tool that is capable of evaluating, monitoring and cognitive control structures associated with exercise performance and adherence to exercise and sport.

Given the importance of positive cognition in improving athletic performance, a look at the research literature shows a big difference between research conducted in the field of metacognitive inside and outside Iran and there is a limitation in the internal investigation of this area[21]. Also, a number of coaches and sport psychologists need an accurate and reliable tool in the minimum possible time assess the talent of athletes in the field of sports performance by evaluating adaptive metacognition and meta-emotion [22]. In this context, one of the most respected researchers in other countries in various aspects of adaptive self-regulatory executive function is the positive metacognitions and meta-emotions questionnaire [1]. If this novel metacognitive tool has a strong psychometric property in athletes, its constructs can help to improve clinical interviews and coaching techniques to maintain mental balance in challenging times and unpredictable circumstances and/or increase sensitivity in the context of metacognitive self-regulation. The questions posed in this analysis were composed of:

1- Are the items of the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) valid in athletes?

2- Are the items of the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) reliable in athletes?

3- Is there any difference in terms of gender, age, duration and type of physical activity on the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ)?

4-What kind of relationship is there between Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) with sport self-regulation and goal-orientation?

Methods

This paper is based on a descriptive research. In other words, first, the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ)has been translated to Persian language. Then, a fluent translation of the questionnaire from English into Persian was assisted by two translators separately. After that, the gaps in the correspondence between the translations were corrected. Eventually, a pilot study was performed the resulting questionnaire on 15 subjects and ongoing problems with the implementation of the test were corrected.

The statistical population is all athletes who were organized for exercise and sport practice in all the clubs in Jahrom city With regard to Kline's rule in the use of factor analysis, the number of questions must be multiplied by 3 to 5[23] (which, according to the 18 items of the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) must be present at approximately 54-90 participants), and considering the possibility of dropping out, the sample consisted of four men's clubs (137 male athletes) and four women's clubs (170 female athletes) who were randomly selected. The 55.4% of participants were women and 44.6% of participants consisted of male athletes in the fields of body training, fitness, aerobic, gymnastics, swimming, skating, volleyball, badminton, basketball, soccer, track and field, cycling, Kung fu, Karate, Taekwondo, Wushu, and chess were engaged. Activity duration for athletes ranged from 1 month to 50 years (1.08 ± 2.83). In addition, study participants aged 15-60 years (7.87 ± 24.76).

Sampling Method

In this analysis, due to the inability to prepare the list of all athletes in Jahrom city the method was from cluster random sampling. In other words, at first, Jahrom city was chosen from all Iranian provinces-because authors are familiar with Jahrom city's cultural attributes. After that, four men's club and 4 women's club were randomly selected from all areas of Jahrom city that included center and countryside, and after referral to these clubs by contributing principal, couches and winning the athletes' cooperation (with lucky drawing gifts from each of 25 participants, 1 gifts), the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ), Metacognition Questionnaire-30 (MCQ-30), the Exercise Self-Regulation Question-

naire(SRQ-E), and Goal Orientation Questionnaire were used while contents and ambiguous sentences were explained word by word.

Measures

The Positive Metacognitions and Meta-Emotions Questionnaire

Beer developed it from a qualitative study consisting of an integrated interview to estimate metacognitive beliefs about cognitive and emotional processes in response to challenges (Appendix 1). Induction of interviews was based on Wells and Matthews' Self-Regulatory Executive Function (S-REF) model, Wells' metacognitive model of emotional disorders, and Neff's meta-emotion theory [2-5, 7]. There are a total of 18 items and a four-degree (from strongly agree "to" strongly disagree response was given per item subject. Three subscales include: a) confidence in extinguishing perseverative thoughts and emotions; b) confidence in interpreting own emotions as cues, restraining from immediate reaction and mind-setting for problem-solving; c) confidence in setting flexible and feasible hierarchies of goals (Appendix 2). Exploratory factor analysis in Bear and Moneta's research supported the questionnaire's three-factor structure, showing that three factors were accounted 54.76% of total positive metacognition variance. The range of item loadings on the corresponding factors was as follows; 0.51 to 0.81 for Factor 1 (Confidence in Extinguishing Perseverative Thoughts and Emotions); 0.45 to 0.72 for Factor 2 (Confidence in Interpreting Own Emotions as Cues, restraining from Immediate Reaction and Mind-Setting for Problem-Solving), and 0.57 to 0.78 for Factor 3 (Confidence in Setting Flexible and Feasible Hierarchies of Goals). Cronbach's alpha coefficients were high with 0.85, 0.76, and 0.85 for Factors 1, 2, and 3, respectively. All, the 18 items comprising the final version of the PMCEQ appears to have good construct validity and internal consistency.

Metacognition Questionnaire-30 (MCQ-30)

It was developed by Wells and Cartwright — Hatton on the basis of the Self-Regulatory Executive Function (S-REF) model of Wells and Matthews, specified for the age range above 18 years of age and consisting of 5 subscales: cognitive confide, positive beliefs about worry, cognitive self-consciousness, negative beliefs about uncontrollability of thoughts and danger, beliefs about need to control thoughts. It can be used separately and in groups. Each item has a 5 point Likert scale that is ordinal between 1 and 5, so the scoring ranges varied between 30 and 120. This questionnaire is appropriate for its validity and reliability. Reliability has been achieved by the Cronbach's alpha coefficient for the range of .72 to .93 and test-retest reliability for the total score were computed .75 after 22 to 118 days while for the subscale, it was reported .59 to .87 [15]. The reliability of this questionnaire in Iran was examined by Shirin Zahed Dastgiri et.al by using Cronbach's alpha coefficient for the total scale was about .91 and subscales were in the range of .71 to .87. The reliability of total scale within 4 weeks has been achieved .73, and for the subscales was reported in the range of .59 to .83. Total scale correlated with trait anxiety scale that was about r=.43 and subscale correlations have been estimated in the range of .58 to .87 [25]. In the present study, Cronbach's alpha for the total scale was estimated in athletic men .61 and women .76.

The Exercise Self-Regulation Questionnaire (SRQ-E)

It was used to assess what reasons have one frequently exercise or engage in physical activity and examine internal self-regulation. The questionnaire was specified for the age range of higher than 18 years old which included 16 items and 4 subscales internal regulation, identified regulation, external regulation, and introjected regulation. Each item has 7 states that its ordinal is from 1 to 7, so the ranges of scores vary from 16 to 119. Validity and reliability of this questionnaire is acceptable. Construct validity through factor analysis was suggested four factors. In addition, all subscales had Cronbach's alpha value (internal consistency) .62 to .85 (12). In the present study, data were indicative of high level of Cronbach's alpha (respectively in men and women .80 and .67) and split-half (respectively in men and women .79 and .62) reliability coefficients of the exercise self-regulation questionnaire totally.

Goal Orientation Questionnaire

The task and ego orientation in sport questionnaire was developed by Duda & Nicholls to measure goal orientation in sport setting (16) which has included 13 items and 2 subscales about task and ego orientation. Each item has 5 point Likert scale that its ordinal is from 1 to 5 (from "strongly agree" to "strongly disagree"). Cronbach's alpha coefficient for the total scale was about .74 and subscales of task and ego orientation were reported .80 and .78. The correlation coefficient of this questionnaire with the perceived motivational climate in sport (r=.68, p<.001) was significant (16). In Iran, Cronbach's alpha coefficient of the questionnaire was estimated .82 by Abolqasemi and Ariapour's study. Internal consist-

ency of task and ego orientations in a sample of 321 athletic students was obtained .82 and .89. Internal consistency by using the correlation between this questionnaire and sport goal scale was significant. Also, Construct validity was found that task-orientation and ego-orientation are two reliable structures separately (26). In the present study, data were indicative of satisfaction level of Cronbach's alpha (respectively in men and women .55 and .72) and split-half (respectively in men and women .46 and .59) reliability coefficients of the task and ego orientation in sport questionnaire totally.

Results

exploratory and confirmatory methods were used to examine "factor analysis" of the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ). In order to determine the number of factors, all agents factorequity (for 18 item) was drawn and according to Scree criteria [1] , it was found that three factors must be considered. Kaiser-Meyer-Olkin (KMO) was .87 and Bartlett's test was significant at p<.0001. Data were subject to become a factor that have an operating weight of .40 or higher. Items 3, 2 and 7 - because of having item loadings weakly- were excluded from the questionnaire items. At all, three factors have eigenvalues higher than 2 that accounted for 47.24% of the total variance. In addition, the factor of "confidence in interpreting own emotions as cues, restraining from immediate reaction and mind-setting for problem-solving" had 3.89 eigenvalues and 21.62% of the total variance was explained. "Confidence in extinguishing perseverative thoughts and emotions" also had 2.46 eigenvalues and 13.68% of the total variance was explicated. Moreover, "confidence in setting flexible and feasible hierarchies of goals" likewise had 2.15 eigenvalues and 11.94% of the total variance was clarified.

It was used from Amos software to compare the fitted structural equation three-factor models of elegance and edited (by eliminating questions 2, 3, and 7 in athletes. As Table (1) modified three-factor model -that is consistent with the results of exploratory factor analysis- was able to be more fit than the original model. Figure 1 represents a suitable model with factor loadings of questionnaire items and structural correlation with the subscale.

Table 1. Comparison of the fitted structural equation three-factor models of elegance and edited in the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ)

Type	X^2	X^2/df	TLI	NFI	IFI	CFI	RMSEA
Elegance	421	3.19	0.75	0.72	0.79	0.79	0.09
Edited	186.48	2.14	0.89	0.84	0.91	0.91	0.06

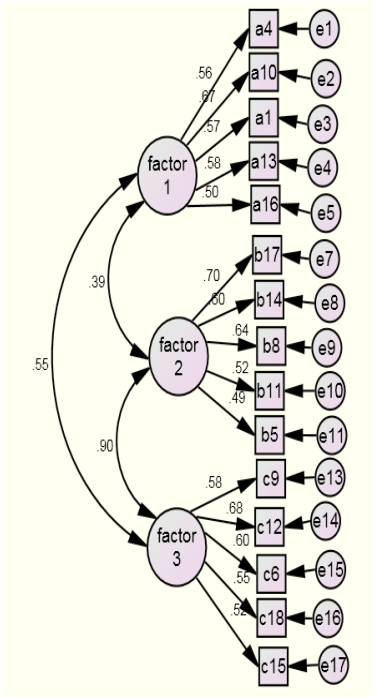

Figure 1. The best fitted three factor model of the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ)

Table 2. Correlations between the positive metacognitions and metaemotions questionnaire with goal-orientation, sport self-regulation, and metacognition-30 questionnaires in women athletes (n=170)

Other questionnaires Positive metacognition	Goal-orientation questionnaire		Sport self-regulation questionnaire			Metacognition-30
Variable	Goal-orientation	Ego-orientation	Self-regulation	External regulation	Introjected regulation	Beliefs about need to control thoughts
Total scale	-0.11	-0.08	0.22***	0.19**	0.23***	0.07
Factor 1	0.18**	0.27***	-0.03	-0.10	-0.03	0.15*
Factor 2	-0.07	0.007	0.22***	0.16*	0.22***	-0.05
Factor 3	0.04	0.11	0.22***	0.14*	0.24***	0.04

****p<0.0001, ***p<0.001, **p<0.01, *p<0.05

Factor 1) confidence in extinguishing perseverative thoughts and emotions; Factor 2) confidence in interpreting own emotions as cues, restraining from immediate reaction and mind-setting for problem-solving; Factor 3) confidence in setting flexible and feasible hierarchies of goals

Table 3. Compression of gender, age-group, duration and types of physical activity in positive metacognition

Variable		n	Mean	Std. Deviation	F
Gender	Male	137	2.75	0.59	9.22*
	Female	170	2.57	0.45	
Age	15-22 year	104	2.69	0.53	5.77**
	22-40 year	142	2.67	0.51	
	More than 40	10	3.02	0.55	
	Indistinct	51	2.41	0.47	
Type of physical activity	Fitness	27	2.97	0.47	3.80***
	Body training	86	2.61	0.54	
	Aerobic	1	3.20	-	
	Swimming	7	2.90	0.57	
	Volleyball	52	2.53	0.36	
	Basketball	7	3.17	0.31	
	Badminton	2	2.33	0.00	
	Track and field	57	2.43	0.38	
	Cycling	2	2.63	0.14	
	Kung fu	43	2.74	0.66	
	Karate	4	2.85	0.37	
	Taekwondo	3	2.67	0.40	
	Wushu	1	2.47	-	
	Gymnastics	1	1.00	-	
	Chess	4	3.00	0.64	
	Soccer	7	2.87	0.37	
	Skating	1	3.73	-	
Duration and types of physical activity	<6 months	33	2.86	0.69	11.73***
	6 months<X<5 year	109	2.74	0.54	
	>5-year	42	2.83	0.45	
	Indistinct	123	2.45	0.40	

***p<0.0001, **p<0.001, *p<0.01

According to the Table (1) factor analysis, internal consistency for each subscale scores and the total scale were extracted that were -.23, .78, .71 for factor 1, 2, 3 respectively. Correlations between factor 2,3 with factor 1 was .29 , .39 respectively and correlations between factor 2 and 3 was .66. The high correlation between the factors and the total scale and lower correlation coefficients between subscales indicate the relative independence of them from each other and so the validity of the total scale. The first factor has a negative coefficient, however, and the second and third factors are relatively lower compared to the theoretical model.

According to the Table (2) with an emphasis on the value of the correlation coefficient, it can be stated that there is a significant relationship between the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) with some subscales of Metacognition Questionnaire-30 (MCQ-30), goal-orientation and sport self-regulation questionnaires and so the positive metacognitions and metaemotions questionnaire has a good concurrent and predictive validity.

By respecting the results of the factor analysis, it was compared differences for gender, age-group, duration and types of physical activity in positive metacognition. Analyses of variance (Table 3) indicate significant differences between men and women in the total positive metacognitions and metaemotions questionnaire. In addition, age, duration and types of physical activity were associated with a marked positive response on metacognition.

Table 4. Cronbach's alpha and split-half coefficients of subscales and total scale scores of the positive metacognitions and metaemotions

Variable	Cronbach's alpha	Split-half
Positive metacognitions/ meta-emotions	0.83	0.86
Factor 1	0.71	0.75
Factor 2	0.73	0.71
Factor 3	0.72	0.76

Factor 1) confidence in extinguishing perseverative thoughts and emotions; Factor 2) confidence in interpreting own emotions as cues, restraining from immediate reaction and mind-setting for problem-solving; Factor 3) confidence in setting flexible and feasible hierarchies of goals

After analyzing the construct, convergent, predictive, and concurrent validity of questionnaire, it is necessary to review questionnaire's reliability coefficients based on results of factor analysis.

According to Table 4, the reliability of subscales by using Cronbach's alpha was very close together (0.71-0.73), but the second and third factors were respectively lowest and most reliable in split-half (0.71-0.73).

Discussion

Regarding the importance of metacognition in the field of identifying talent in sports, improving sports performance and adherence to exercise and sport, the aim of the study was to assess the psychometric properties of Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) was developed by beer based on Wells and Matthews' Self-Regulatory Executive Function (S-REF) model, Wells' metacognitive model of emotional disorders, and Neff' meta-emotion theory and present study was translated to Persian by using two translators [1-5, 7]. Validity was examined by exploratory and confirmatory factor analysis. confirmatory factor analysis revealed three factors which are the best fit model with slight modifications to the original model (deleting items 2, 3, and 7) to assess the validity of confidence in extinguishing perseverative thoughts and emotions, confidence in interpreting own emotions as cues, restraining from immediate reaction and mind-setting for problem-solving, and confidence in setting flexible and feasible hierarchies of goals. Nevertheless, the factor structure consistent with Beer's studies (24) showed that this tool is not a one-dimensional structure, but also three distinct and stable structures, thus it is an indication of the construct validity of the measurement tool in the young athletes (from Fars province) of the Iranian community.

As Ommundsen found, boys use more metacognitive techniques in physical education than girls (18), the present study also showed that there is a significant difference in positive metacognitions and meta-emotions between young athletic men and women (15-60 years). In addition, age, duration and type of physical activity have a significant impact on metacognition is consistent with previous studies in this area (e.g., 19, 20). In addition, Metacognition Questionnaire-30 (MCQ-30) aims to determine the concurrent validity of Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) . Results showed that beliefs about the need to regulate sub-scale thoughts have a medium relationship with confidence in the extinguishing perseverative thoughts and emotions

(first factor) is supported by Bear's study (1).

The relationship between metacognition with goal orientation and self-regulation questionnaires has been explored in order to determine the predictive validity of the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ). Theodosiou, Papaioannou's research showed that metacognition is related to goal-orientation and self-regulation in physical education (13), the findings of this study also showed that the total scale of Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ)have a positive correlation with ego-orientation in female athletes. However, a significant positive relationship was established between the first factor (confidence in extinguishing perseverative thoughts and emotions) and goal orientation especially ego-orientation.Consistent with Bear's research findings, this study showed that the whole scale of Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) has a direct correlation with self-regulation, particularly introjected regulation. Specifically, second (confidence in interpreting own emotions as cues, restraining from immediate reaction and mind-setting for problem-solving) and third factor (confidence setting goals hierarchy flexible and practical) had a significant correlation with self-regulation particularly external regulation, and introjected regulation. Therefore, the positive metacognitions and metaemotions questionnaire has a good predictive and concurrent validity.

The reliability of total questionnaire was calculated using Cronbach's alpha .83 and split half .86. Cronbach alpha coefficients for three factors 1, 2, and 3, were 0.71, 0.73, 0.72 respectively and split half was estimated 0.75, 0.71, 0.76 which showed high and suitable reliability of the Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ).

The use of a self-report questionnaire in survey design, potential self-report bias, and social desirability bias may have reflected a possible limitation of the present study. In the field of psychopathology, two limitations of current metacognitive models can be inferred: (1) focus on exclusively cognitive constructs and processes which lacks investigation of the social environment and (2) lack of accounting for personality-related factors, specifically for adaptive assets. As a common denominator the vast majority of metacognitive concepts distinguish between metacognitive knowledge, and metacognitive control and regulation. Another possible limitation is that PMCEQ is not intended as a domain-specific tool (i.e., it is not intended to measure metacognition and meta-emotion in a specific physical activity), but its purpose is to obtain an overall measure of self-regulatory executive function and adaptive meta-emotion, and we have chosen a sport domain approach because it enables metacognition to be measured.

Nonetheless, given the known impact of direct and indirect positive metacognition on adherence to sport-related compliance behaviors and exercise on responsive mental and physical and balanced lifestyles, it appears that exploring the use of positive metacognition and meta-emotion in physical activity can not only improve performance and reduce drop-out / withdrawal, but also encourage high levels of physical activity. This study would provide scholars in the areas of personality and positive psychology with an assessment tool that allows testing whether adaptive metacognitive traits explain hedonic and eudaimonic processes and outcomes, controlling for maladaptive metacognitive traits. Further investigation on positive metacognitions and metaemotions in this population may provide information that can improve information and implementation of targeted individualized interventions to assess athletic talent. In addition, further investigation of the psychometric characteristics of this questionnaire, would provide the basis for assessing the suitability of the incentive-based clinical interventions to maintain healthy behavior changes. Hence, it is suggested to generalize the results of the present study, it is necessary to administrate or investigate on athletes in other provinces at different skill levels and ages.

Conclusion

It can be argued that the efforts in the field of evaluating the psychometric properties of Positive Metacognitions and Positive Meta-Emotions Questionnaire (PMCEQ) in athletes have been useful and that this questionnaire can be used in terms of style of administration (in groups or individually) and ease of assessment, which is the most important aspect of the practical test, is a valid and useful tool that can be used as a valid and reliable tool for sports research and psychology.

Ethical Considerations

Compliance with ethical guidelines

The code of ethics in the study included: IR.MUMS.REC.1395.5

Funding

This research did not receive any specific grant fromfunding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions

Study design: Zahedeh Rahmanian, Mohammad Vaez Mousavi; Data collection and analysis: Zahedeh Rahmanian; Manuscript preparation: Zahedeh Rahmanian, Mohammad Vaez Mousavi.

Conflict of interest

The authors declared no conflict of interest.

Reference

[1] Beer N. Effects of positive metacognitions and meta-emotions on coping, stress perception and emotions. (Doctoral dissertation, London Metropolitan University). 2011. Linked in: https://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.540610

[2] Wells A, Matthews G. Modeling cognition in emotional disorder: The S-REF model. Behav Res Ther 1996; 34(11–12):881-8.

[3] Wells A, Matthews G. Attention and Emotion. A Clinical Perspective. Hove: Psychology Press; 2016. Linked in: https://content.taylorfrancis.com/books/download?dac=C2004-0-23127-7&isbn=9781317716181&format=googlePreviewPdf

[4] Wells A. Metacognitive Therapy for Anxiety and Depression. New York: The Guilford Press; 2011. Linked in: https://psycnet.apa.org/record/2008-15953-000

[5] Wells A. Emotional Disorders and Metacognition: Innovative Cognitive Therapy. Chichester, UK: John Wiley & Sons; 2002. Linked in: https://search.proquest.com/openview/8e58ad5ba8ac6f86adab73fd75485b69/1?pq-origsite=gscholar&cbl=38181

[6] Mitmansgruber H, Beck TN, Hofer S, & Schulsler G. When you don't like what you feel: Experiential avoidance, mindfulness and meta-emotion in emotion regulation. Pers Individ Dif . 2009; 46(4): 448-53. Linked in: https://doi.org/10.1016/j.paid.2008.11.013

[7] Neff KD. The development and validation of a scale to measure self-¬compassion. Self Identity 2003; 2(3): 223-50.

[8] Lazarus RS. Thoughts on the relation between emotion and cognition. Am Psychol 1982; 37(9): 1019.

[9] Jager C, Bartsch A. Meta-Emotions. Grazer Philosophische Studien. 2006; 73(1): 179-204.

[10] Goleman D. Emotional Intelligence: 10th Anniversary Edition; Why It Can Matter More Than IQ. London: Bloomsbury; 2006. Linked in: https://www.amazon.com/Emotional-Intelligence-10th-Anniversary-Matter/dp/055380491X/

[11] Zimmerman BJ. Chapter 2 - Attaining Self-Regulation: A Social Cognitive Perspective. In: Monique B, Paul RP, Moshe ZeidnerA2 - Monique Boekaerts PRP, Moshe Z, editors. InHandbook of self-regulation 2000 Jan 1 (pp. 13-39). Academic Press.

[12] Ryan RM, Connell JP. Perceived Locus of Causality and Internalization: Examining Reasons for Acting in Two Domains. J Pers Soc Psychol 1989; 57(5):749.

[13] Theodosiou A, Papaioannou A. Motivational climate, achievement goals and metacognitive activity in physical education and exercise involvement in out-of-school settings. Psychol Sport Exerc 2006; 7(4):361-79.

[14] Kelly SA, Melnyk BM, Jacobson DL, O'Haver JA. Correlates among Healthy Lifestyle Cognitive Beliefs, Healthy Lifestyle Choices, Social Support, and Healthy Behaviors in Adolescents: Implications for Behavioral Change Strategies and Future Research. J Pediatr Health Care 2011; 25(4):216-23.

[15] Wells A, Cartwright-Hatton S. A short form of the metacognitions questionnaire: properties of the MCQ-30. Behav Res Ther 2004; 42(4):385–96.

[16] Duda JL, Nicholls JG. Dimensions of Achievement Motivation in Schoolwork and Sport. J Educ Psychol. 1992; 84(3):290-99.

[17] McPherson SL, Thomas JR. Relation of knowledge and performance in boys' tennis: Age and expertise. J Exp Child Psychol. 1989; 48(2):190-211. Linked in: https://doi.org/10.1016/0022-0965(89)90002-7

[18] Ommundsen Y. Implicit Theories of Ability and Self-regulation Strategies in Physical Education Classes. Educ Psychol. 2003; 23(2):141-57. Linked in: https://doi.org/10.1080/01443410303224

[19] Lee K, Chen L. the development of metacognitive knowledge of basic motor skill: walking. J Genet Psychol. 1996; 157(3):361-75.

[20] Sperling RA, Howard BC, Miller LA, Murphy C. Measures of Children's Knowledge and Regulation of Cognition. Contemporary educational psychology. 2002; 27(1):51-79.

[21] Kazemi H. An Assessment of the Relationship between metacognitive States, Problem Solving and Psychological well-being. New Educational Approaches. 2012; 7 (1):91-106.

[22] Martini R, Shore BM. Pointing to parallels in ability-related differences in the use of metacognition in academic and psychomotor tasks. Learn Individ Differ 2008; 18(2):237-47.

[23] Kline RB. Principles and Practice of Structural Equation Modeling. Guilford publications; 2015.

[24] Beer N, Moneta GB. Construct and concurrent validity of the Positive Metacognitions and Positive Meta-Emotions Questionnaire. Pers Individ Dif. 2010; 49(8): 977-82.

[25] Shirin Zahed Dastgiri S, Goodarzi MA, Rahimi G, and Naziri, G. Factor structure, validity and reliability of cognition 30. Psychology. 2008; 12 (4): 445-461.

[26] Abolqasemi A, Ariapour S. Relationship between coping strategies, goal oriented and competitive anxiety with sport performance of group and individual athletic students. Research in Sports Sciences 2006; 13: 141-155.