





ABSTRACT

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Anger and Optimal Performance in Karate: An Application of the IZOF Model

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The present investigation applied the theoretical framework of the Individual Zones of Optimal Functioning (IZOF) model (Hanin, 1997, 2000, 2003) as an idiographic and sports-specific approach to study anger and other emotional experiences in 107 highly skilled Spanish karate athletes. First, the study examined optimal and dysfunctional anger intensity prior to, during, and after athletes' best and worst performances using the State-Trait Anger Inventory-2 (Spielberger, 1999) and recall individualized anger profiling, specifically developed for this study. Second, the content of anger and other performance-related states was explored in the same performance situations using the metaphor-generation method (Hanin & Stambulova, 2002), recall individualized anger and emotion profiling (Hanin, 2000). Third, athletes' perceptions of the functional impact of anger on performance and their optimal states were examined using open-ended questions. The results revealed great inter-individual variability in optimal and dysfunctional anger intensity levels, which were low, moderate or high for different athletes. Athlete-generated metaphors describing their states were highly idiosyncratic, holistic, and action-oriented. The content of metaphors was very different prior to, during and after best and worst performances. Self-generated metaphors reflected high action readiness in best performances, and low action readiness in worst performances. A comparison of self-generated emotion descriptors with Lazarus' (2000) 15 basic emotions revealed a mismatch, as in performance situations athletes only described three positive and five negative emotions. The content of anger and emotion descriptors was highly idiosyncratic and context-specific. In best performances, anger states were related to the generation of additional energy. In contrast, in worst performances anger reflected a lack of energy, an inability to recruit resources or their ineffective utilization. The results indicated that athletes' perceptions of their optimal states were characterized by positively and negatively toned states, while also displaying emotional patterns and meta-experiences. Athletes' descriptions had multiple connotations with all the modalities of any given performance state. Overall, the results replicate earlier IZOF-based research on anxiety and other positive and negative emotions extending the model to the study of performance-related anger.

Keywords: emotional experience, functional impact, high achievement sport, idiographic, IZOF model, meta-experience, psychobiosocial state.

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LIST OF ORIGINAL PUBLICATIONS

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1 INTRODUCTION

The competitive sport setting offers an ideal natural environment for the study of emotions as important aspects of human life. Anger, satisfaction, disappointment, or joy can be experienced while involved in any sporting activity. Moreover, it is generally accepted by athletes, coaches and practitioners that psychological variables, such as emotions, also play an important role in athletic performance. The present investigation focuses on this relationship. Specifically, this study examines anger and other emotional experiences focusing on their content, intensity and functional impact on karate performance.

Conceptually, the definition of emotion remains unclear. For instance, the Oxford English Dictionary defines emotion (from Latin *emovere* – to move) as “a mental ‘feeling’ or ‘affection’ as distinguished from cognitive or volitional states of consciousness”. As the definition shows, no difference is made between the terms feeling, affect, and emotion. However, these terms as well as mood have been conceptually distinguished on the basis of the time course, intensity and specificity of the antecedent. Thus, emotion is considered to be relatively brief, intense and related to a specific object, whereas mood is less intense, longer lasting and with no relation with an object. Affect is a general term, which includes emotion, feeling and mood, whereas feeling is considered the subjective experience of both emotions and moods (Oatley & Jenkins, 1996). Nevertheless, in sports, as Lane and Terry (2000) state it is not always possible to differentiate between emotion and mood in terms of intensity, duration or specificity of the antecedent. Moreover, such a distinction is not always clear at the level of measurement.

Another option to overcome such conceptual confusion and include the phenomenology of emotions is the use of a more general term, such as subjective emotional experience (Hanin, 2000). As such, three kinds of experiences can be distinguished: situational experiences or states, relatively stable patterns of experiences, and meta-experiences or individual’s knowledge, attitudes about his or her own emotional experiences (Hanin, 2003). Emotional experiences, as important components of adaptive behavior, reflect the interaction between the person and the environment (Vygotsky 1926, cited in

Hanin, 2000). Thus, different emotional experiences are the result of perceptions of a balance or imbalance between the individual's resources and the demands of the environment.

On the other hand, two different perspectives have typically been used in the study of the content or quality of emotions, a global affect approach that focuses on dimensions such as hedonic tone (i.e., pleasure/displeasure) and activation (i.e., sleep/tension) (Watson & Tellegen, 1985), and a single emotion approach that focuses on a limited number of primary discrete categories such as anger, anxiety, happiness or fear (Lazarus, 1991, 2000).

In sports, much research interest in the area of emotions has focused on the effects of a single discrete emotion, anxiety (Hanin, 1995; Jones, 1995; Martens, Vealey & Burton, 1990; Raglin, 1992). However, even though anxiety is important in competitive sports, researchers (Cerin, Szabo & Williams, 2001; Gould et al., 1999; Gould & Tuffey, 1996; Hanin, 1997; Lazarus, 2000) have highlighted the need to examine other positive and negative emotional experiences.

Anger, which is often evoked by stress in competitions (Isberg, 2000) is among the most frequently experienced states (Gould et al. 1999; Hanin, 1997, 2000; Hanin & Syrjä 1995a, 1995b, 1996; Robazza & Bortoli, 2003; Robazza, Bortoli & Nougier, 1998; Syrjä, 2000) and an important factor in predicting athletic performance (Friend & LeUnes, 1990; Terry, 1995). In contrast to anxiety research, which indicates the beneficial as well as detrimental effects upon performance (Hanin, 1995; Jones & Swain, 1992), the role of anger remains unclear. Anger is considered to have a negative impact, especially in the area of clinical psychology, where it has been found to be related to hypertension, high blood pressure, coronary heart disease, vulnerability to illnesses or even morbidity and death (Diamond, 1982; Spielberger & London, 1990; Suinn, 2001 for a review). Similarly, in the context of sports, low intensities of anger are deemed to be beneficial for performance (Morgan, 1985). In addition, mental preparation or intervention programs striving for performance enhancement usually aim at a reduction of negative states such as anger (Loehr, 1982; Orlick, 2000). However, some studies indicate that anger is not associated only with unsuccessful performance, as the previous approaches might suggest, but also with successful performances (Hanin & Syrjä, 1995a, 1995b, 1996; Robazza & Bortoli, 2003; Robazza, Bortoli & Nougier, 1998).

Karate is an individual sport that consists of two modalities, kata (form) and kumite (fighting). A kata is an exercise that contains stances, blocks and strikes that follow a precisely set pattern lasting from 60 to 90 seconds. Points are awarded by judges depending on the quality of the performance. In kumite two competitors fight against one another following a standardized set of judging rules. A kumite bout runs for two minutes or less if one contestant scores 8 points, and it can be extended another minute in the case of a draw. The context of karate, due to its short duration especially appears to be influenced by emotions (Terry & Slade, 1995), and thereby suited to the study of anger and emotion-performance relationships. Moreover, due to the individual

nature of this martial art, group differences in performance are avoided. Finally, karate offers a context where feelings of anger and aggressive behavior are often experienced.

Traditionally, the concept of optimality has been considered universal for all athletes. However, in this study optimal emotional states are thought to reflect individual differences in the availability of resources and the ability to recruit and effectively utilize these resources. Thus, optimal emotions are regarded as the most relevant and appropriate for a particular athlete performing a specific task (Hanin, 2000, 2004).

Most models or theories that examine the relationship between emotions and athletic performance, which are typically borrowed from general psychology and applied to sports, use a nomothetic approach. However, this nomothetic (group-based) approach underestimates the athlete's perspective and it is often ineffective when applied to individuals (Hanin, 2000). Therefore, in this investigation the theoretical framework of the Individual Zones of Optimal Functioning (IZOF) model (Hanin, 1997, 2000, 2003, 2004), as a sports-specific and idiographic approach, is used for the qualitative and quantitative analysis of athletes' anger and other emotional experiences related to successful and unsuccessful karate performances. The following section provides a review of the most common models used in the study of the emotion-performance relationship.

1.1 Emotion-performance relationship in sport

Major models examining the relationship between emotions and athletic performance have typically been limited to physiological activation or arousal and anxiety. Thus, drive theory, first outlined by Hull (1943) and modified by Spence & Spence (1966) proposes that performance is a function of drive and habit strength. Drive is generally considered synonymous with global arousal, whereas habit strength refers to the dominance hierarchy of correct (and incorrect) behaviors, which is high at later stages of acquisition. According to drive theory, when a task becomes well learned, and habit strength is high, the correct responses should dominate under high levels of arousal. However, lack of empirical support has been found for drive theory, which also failed to accommodate the effects in complex tasks (Neiss, 1988).

Thus, in contrast to the linear relationship between arousal and performance assumed by drive theory, researchers adopted the Inverted-U Hypothesis to explain arousal-performance relationships. The Inverted-U Hypothesis was based on Yerkes & Dodson's Law (1908) and stated that performance improves as arousal increases from low to moderate levels, at which it reaches its peak. A rapid decline in performance occurs as arousal increases above these moderate levels. However, the Inverted-U Hypothesis has also been criticized, among other reasons, for the lack of empirical support and

the use of a unidimensional conceptualization of arousal (Neiss, 1988; Raglin, 1992; Raglin & Hanin, 2000).

The issue of multidimensionality has been addressed by distinguishing mainly between cognitive and somatic components of anxiety, which have been examined within the Multidimensional Anxiety Theory (Martens et al., 1990) and the Cusp Catastrophe Model (Fazey & Hardy, 1988). The Multidimensional Anxiety Theory stated that somatic anxiety formed an inverted-U relationship with performance while cognitive anxiety was negatively related to performance. Limitations of this theory include considering only separate effects of cognitive and somatic anxiety and a lack of empirical support (Gould & Krane, 1992). In contrast, the Cusp Catastrophe Model, as described by Fazey and Hardy (1988), assumes that cognitive anxiety mediates the effects of physiological arousal, which can directly influence performance. Specifically, the model states that with low cognitive anxiety, physiological arousal follows an inverted-U relationship with performance; however, when cognitive anxiety is high, performance improves up to a critical point, after which it suddenly declines. Nevertheless, no direct evidence supports the application of the catastrophe model, which has also been criticized in terms of the complexity and number of assessments, needed to test it (Gould & Krane, 1992).

Another approach to the anxiety-performance relationship has been taken by the Reversal Theory, proposed by Apter (1982) and applied to sport settings by Kerr (1997). According to the Reversal Theory, meta-motivational states or ways in which individuals interpret their motives exist in alternative pairs between which reversals occur. In sports, the telic-paratelic pair has been considered to play an important role in the way athletes perceive their own arousal. Thus, in the telic state (low arousal preferred), high levels of felt arousal are experienced as anxiety (unpleasant), and low levels of felt arousal perceived as relaxation (pleasant), whereas in the paratelic state (high arousal preferred), low levels of felt arousal are perceived as boredom (unpleasant) and high levels of felt arousal are experienced as excitement (pleasant). However, little empirical support for this theory has been provided, which might be explained by the difficulty of testing it (Jones, 1995).

Although the study of stress-related emotions has been dominant, researchers have also examined the relation between performance and other emotions. For instance, Morgan (1985) stated that successful athletes exhibited what he called an iceberg profile characterized by high scores for vigor and low scores for tension, confusion, depression, anger and fatigue, which reflect positive mental health. Several studies have tested Morgan's iceberg profile; however, the empirical evidence is equivocal. A meta-analysis of 33 studies (Rowley, et al. 1995) revealed an overall effect size of 0.15, which accounted for less than 1% of the variance, questioning the predictive validity of the iceberg profile. A study by Terry and Lane (2000) indicated significant differences between emotion scores for an athletic sample and existing normative scores for college students and psychiatric outpatients. However, athletes' scores, moderated by the level of achievement and situation, tended to be more

positive and resulted in a pronounced iceberg profile. Like the study by Rowley, et al. a more recent meta-analysis of 29 studies by Beedie, Terry, & Lane (2000), showed minimal effect sizes between mood and athletic achievement. Furthermore, the authors indicated that emotion responses do not reliably differentiate between athletes at different levels of achievement. Interestingly, it was found that anger and tension scores were associated with both positive and negative performance outcomes.

All these approaches have focused on the intensity of anxiety or other emotions rather than on their content. An attempt to overcome such limitation, is the work of Jones and Swain (1992, 1995), who proposed the need to examine the direction or the perceived functional impact of anxiety upon performance. Empirical evidence proving support for the distinction between intensity and direction has been found (Jones, Hanton & Swain, 1994; Jones & Swain, 1992). However, the directionality hypothesis only examines the extent to which the athletes rate cognitive and somatic symptoms of anxiety as facilitating or debilitating for performance.

Furthermore, most of these models, which underestimate or even disregard the intra-individual dynamics of athletes' subjective experiences (Hanin, 1997) fail to provide an explanation of the functional impact of emotions on performance. Thus, and as an alternative to nomothetic approaches, the IZOF model was proposed as an idiographic, reality-grounded, and sports-specific approach to the study of individually optimal and dysfunctional emotional experiences related to athletic performance. The following section describes the IZOF, which serves as the theoretical framework for the present investigation.

1.2 Performance-Related States: The IZOF Model

The IZOF model, which was originated from the study of individually optimal anxiety in top-level athletes (Hanin, 1978, 1986, 1989, 1995), focuses on the structure, dynamics and function of situational emotional experiences related to individually successful and unsuccessful performances.

Emotions are conceptualized as a component of performance-related states, which are reflected in situational subjective emotional experiences, relatively stable emotional patterns, and meta-experiences. In contrast to previous approaches that implied limited dimensions such as cognitive and somatic anxiety, or arousal, the IZOF model uses a multilevel and systems description that contains at least five interrelated dimensions: form, content, intensity, time, and context. The form, content and intensity dimensions describe the structure of athletes' subjective experiences, while time and context characterize the dynamics of these experiences.

In contrast to early unidimensional conceptions of arousal (Hull, 1943; Spence & Spence, 1966; Yerkes & Dodson, 1908), or the limited two components

(i.e., cognitive, somatic) of anxiety, in the IZOF model a wider perspective is taken. Performance-related states can be manifested in seven basic forms: cognitive, affective, motivational, bodily, kinesthetic, operational, and communicative, which together provide a relatively complete description. To date, IZOF-based research has focused on the affective (Hanin, 1995, 1997; Hanin & Syrjä, 1995a, 1995b, 1996), motivational (Hanin, 1999), and bodily (Robazza & Bortoli, 2003) components of performance states and their interactive effects (Hanin, 2000). Moreover, the IZOF model has been extended from the study of a discrete emotion, anxiety (Hanin, 1978, 1986, 1989), to other positive and negative emotions (Hanin, 1997; Hanin & Syrjä, 1995a, 1995b, 1996; Robazza, Bortoli & Nougier, 1998).

The IZOF model combines both global affect and single emotion approaches to categorize the content of emotions according to four emotion categories derived from the hedonic tone (pleasant-unpleasant) and functionality (optimal-dysfunctional) distinctions. These categories are pleasant and functionally optimal emotions (P+), unpleasant and functionally optimal emotions (N+), pleasant and dysfunctional emotions (P-), and unpleasant and dysfunctional emotions (N-). These four categories provide a broad structure that can accommodate a wide range of idiosyncratic, individually relevant, and task-specific emotions related to successful and unsuccessful performances.

The intensity of performance-related states is functionally related to the perceived effort invested in a sporting activity and the energizing (de-energizing) and organizing (disorganizing) aspects of the performance process. In the IZOF model, intensity is individually conceptualized using the in-out of the zone notion. In contrast to previous approaches, which consider absolute levels of intensity, the in-out of the zone notion is concerned with the distance between actual and optimal or dysfunctional levels or zones of intensity. Thus, as applied to anxiety research, the IZOF model holds that a high probability of successful performance occurs when an athlete's actual anxiety level is near or within his or her previously established optimal zone of intensity. Moreover, optimal and dysfunctional intensity levels can be low, moderate, or high and vary within and across athletes (see Jokela & Hanin, 1999; Raglin & Hanin, 2000).

The dynamics of performance-related experiences are reflected in three functionally different but interrelated temporal situations: pre-event (preparation for action), mid-event (task execution), and post-event (evaluation of performance). Although examining the dynamics of emotions across the temporal dimension is important for the development of efficient individualized interventions (Cerin, Szabo, Hunt, & Williams, 2000), most research attention has focused on competitive anxiety in pre-event situations. As an exception, Hanin and Stambulova's study (2002) revealed that idiosyncratic emotional content varies across pre-, mid-, and post-event performances.

According to the IZOF model, context is an environmental characteristic that reflects the impact of situational, interpersonal and intra-group

determinants on the intensity and content of emotions. The context in this investigation is competitive sport with a focus on most successful and most unsuccessful performances.

Finally, the IZOF model uses the resources-matching hypothesis (Hanin, 2000) to explain the functional impact of emotions on performance. Optimal positive and negative emotions reflect the availability of resources and their effective recruitment and utilization by producing energizing (enhanced effort) and organizing (enhanced skill) effects, which result in high-quality performance and the achievement of individually successful performance outcomes. In contrast, dysfunctional positive and negative emotions usually reflect a lack of resources or their ineffective recruitment and utilization by producing de-energizing and disorganizing effects.

1.3 Measurement of Emotion Content

An accurate description of the content of emotional experiences related to successful and unsuccessful performances is very important for the development of effective regulation programs. Typically, athletes' subjective emotional experiences are examined using self-report standardized scales borrowed from general psychology such as the State-Trait Anxiety Inventory, (STAI; Spielberger, Gorsuch, & Lushene, 1970), the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971), the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) or sports-specific scales such as the Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Burton, Vealey, Bump & Smith, 1990).

Although these scales, which are used within a nomothetic framework, provide valuable information about inter-individual differences or group tendencies, they contain some limitations. For instance, a study by Syrjä and Hanin (1997a) compared the content of athletes' emotional experiences related to individually successful and unsuccessful performances and the content in the STAI, POMS, PANAS, and CSAI-2, revealing that athlete-generated emotion descriptors were different from the items included in such scales in 83-90% of cases. Other studies have shown similar results (Syrjä & Hanin, 1997b; Hanin, Jokela, & Syrjä, 1998; Robazza, Bortoli, Nocini, Moser, & Arslan, 2000), indicating that there is a discrepancy between the content of the items included in standardized scales and the actual vocabulary used by athletes.

Thus, for the assessment of personally relevant emotion content, it is recommended that individualized scales with athlete-generated items (descriptors) be used. Another important aspect in the assessment of performance-related emotions is the development of sport or task-specific scales, given that general scales might not include various functional aspects specific to sport (Hanin, 2000).

Individualized methods of assessing the generation of optimal and dysfunctional idiosyncratic emotion descriptors include in-depth interviews with open-ended questions, individualized emotion profiling, metaphor-generation method, and narratives. An advantage of using interviews is that they allow for the generation of idiosyncratic content and individually meaningful labels describing performance-related states. However, using interviews could be less effective in athletes with a lack of awareness or verbal skills (Hanin, 2003). Individualized emotion profiling (Hanin, 2000) was developed based on the assumption that skilled athletes are aware of, and thus able to recall their experiences, especially in important competitions. This methodology identifies individually relevant emotion content, optimal and dysfunctional emotion intensity, context, and the interaction effects of optimal and dysfunctional emotions. A recent development within the framework of the IZOF model includes the metaphor-generation method (Hanin, 2000; Hanin & Stambulova, 2002) as a holistic method to symbolically describe athletes' performance-related states. Previous studies (Hanin & Stambulova, 2002; Hanin, Stambulova, Lukkarila, & Tummavuori, 2001) have indicated the feasibility of this method as a holistic and functionally meaningful symbolic description of performance-related states. Finally, narratives as the personal stories that individuals tell can, for instance, recreate the reality in high-level performers or identify most appropriate ways of coping (Hanin, 2003).

On the other hand, the use of self-report measures, especially in the application of actual assessments (direct method) has some limitations. First, they are not appropriate for assessments during performance, and they may be invasive immediately prior to important competitions as they can distract athletes from their preparation routines, (Hanin, 1986, 1995; Hanin & Syrjä, 1995b). Second, optimal and dysfunctional patterns of emotions can be identified by examining actual intensity scores in different successful and unsuccessful competitions. Typically, optimal intensity zones are calculated by exploring the distribution of intensity scores using the mean \pm 0.5 the standard deviation range or measures of dispersion such as interquartiles as criteria. However, this method requires repeated actual assessments and several data points, which is usually time consuming and cost ineffective. Third, using actual measures in competitive sports underestimates or ignores athletes' past performance history (Hanin, 2000).

An alternative to this method is the use of recall measures (indirect method) consisting of retrospective reports of athletes' emotional experiences. Although research has indicated the influence of mood (Parrott, & Sabini, 1990) and performance feedback for novel tasks or tasks with little personal significance (Brewer, VanRaalte, Linder and VanRaalte, 1991) on recall, empirical evidence shows high accuracy between actual and recalled anxiety (see Raglin and Hanin, 2000 for a review). In spite of the limitations of this method, which relies on an athletes' awareness of their subjective experiences, the use of recall measures allows for the examination of athletes' subjective experiences, patterns and meta-experiences in the three (prior to, during and

after) stages of performance, taking into account the athlete's past performance history. Additionally, regular recall and processing of performance-related emotional experiences can substantially enhance an athlete's awareness and acceptance of their experiences. Thus, in this investigation, individualized emotion profiling and the metaphor-generation method using recall measures and interviews with open-ended questions were used in the assessment of anger and other performance-related states.

1.4 Anger: Conceptualization and Measurement

The concept of global arousal and the use of undifferentiated measures were criticized resulting in the abandonment of arousal as a unidimensional construct. Researchers have addressed the issue of multidimensionality by considering separate components, such as cognitive and somatic anxiety. As for anger, most researchers define anger as an emotional reaction, implying multidimensionality by emphasizing different components. Thus, for example, physiological and behavioral components were highlighted by Buss (1961), who included facial-skeletal and autonomic components in his definition of anger. Feshbach (1964) also conceptualized anger as an undifferentiated state of emotional arousal with expressive components. According to Kaufmann (1970) anger involves physiological changes and cognitive correlates. Kassinove and Sukhodolsky (1995) defined anger as "a negative, phenomenological (or internal) feeling state, associated with specific cognitive and perceptual distortions and deficiencies... subjective labeling, physiological changes, and action tendencies to engage in socially constructed and reinforced organized behavioral scripts" (p. 7) calling thereby attention to the phenomenology of anger, which had been a rather neglected topic. Lazarus (2000), who places importance on the cognitive, motivational, and relational aspects, differentiates anger from other emotional states proposing "a demeaning offense against me and mine" as the core relational theme for anger (p. 234).

However, there has been conceptual confusion surrounding the constructs of anger, hostility and aggression, which have not always been clearly differentiated (Spielberger et al., 1983, 1985). Thus, to clear such ambiguity Spielberger and colleagues (1985) proposed the notion of the AHA! Syndrome to refer to anger, hostility and aggression. Anger was defined as "an emotional state that consists of feelings that vary in intensity, from mild irritation or annoyance to fury and rage" whereas hostility, which usually involves angry feelings, was considered "a complex set of attitudes that motivate aggressive behaviors directed toward destroying objects or injuring other people" (Spielberger et al., 1983, p. 162). Moreover, the importance of distinguishing between anger as an emotional reaction (state), and the disposition to experience anger (trait) was also emphasized (Spielberger, et al., 1983).

In the IZOF model, anger is conceptualized as a component of performance-related psychobiosocial states, and thus is characterized by a specific constellation of subjective emotional experiences. Such experiences can be described by cognitive, affective, motivational, bodily, kinesthetic, operational, and communicative modalities of a psychobiosocial state.

Standardized scales developed within the global affect approach, including items to measure anger, which is conceptualized as negative affect, are the PANAS and the Affects Balance Scale (ABS; Derogatis, 1975). However, other scales, developed within the basic emotion approach, have been constructed to measure anger and other related phenomena (see Table 1). For instance, the Buss-Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957) was developed to measure hostility. The Reaction Inventory (RI; Evans & Stangeland, 1971), the Anger Self-Report (ASR; Zelin, Adler & Myerson, 1972), and the Novaco Anger Inventory (AI; Novaco, 1975) were developed in an attempt to distinguish between anger and hostility. However, all these scales have several methodological limitations. Moreover, these measures fail to distinguish between anger as a state (experience) and as a trait (disposition) (Spielberger, et al., 1983).

Thus, Spielberger, et al. (1983) developed the State-Trait Anger (STAS) Scale, which is similar in format and conception to the STAI, to assess the intensity of anger as an emotional state, and individual differences in the disposition to anger. The Anger Expression (AX) Scale was later constructed (Spielberger, et al., 1985) to measure the frequency with which individuals experience, but hold in (suppress) angry feelings, or express them in verbal or physical behavior. Both the STAS and AX scales were then combined to form the State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988), which measures the experience, expression and control of anger. Alpha coefficients for the STAXI scales were high ranging from .64 to .94 in samples of 1010 men and women (Spielberger, Reheiser, & Sydeman, 1995). Recently, the STAXI was revised and expanded to form the STAXI-2 (Spielberger, 1999), which consists of trait and expression scales which were unchanged, the state anger scale that comprises of three different components (feeling angry, feeling like expressing anger verbally, and feeling like expressing anger physically), and an entirely new scale for measuring the control of suppressed anger.

The POMS, as another scale developed in the general psychology context, consists of six subscales measuring anger, tension, depression, fatigue, confusion and vigor. In sports, several studies have used the POMS to predict performance using Morgan's (1985) iceberg profile; however, some studies have not provided support for such a profile (Arruza, Balagué, & Arrieta 1998; McGowan & Miller, 1989; McGowan, Miller, & Henschen, 1990; Terry & Slade, 1995). For instance, Terry and Slade (1995), who classified karate winners and losers according to their pre-performance mood, found high scores for anger in winners. Similar results were obtained from other studies where successful athletes scored higher in anger than unsuccessful athletes in karate (McGowan

& Miller, 1989; McGowan, Miller, & Henschen, 1990) and judo (Arruza, et al., 1998).

Given that a sport-specific measure of situational anger has not yet been developed (Isberg, 2000), and given the results of previous studies which have indicated the feasibility of using the STAI to assess optimal and dysfunctional intensity levels of anxiety (Hanin, 1978, 1986, 1989), the STAXI-2 was considered a suitable instrument in the study of optimal and dysfunctional anger intensity.

As the above review of the literature indicates, there is a need for more empirical studies on the nature and functional impact of anger on athletic performance as well as a systematic examination of optimal and dysfunctional levels of intensity of anger. The dynamics of performance-related anger and other emotional experiences need also to be studied across pre-, mid-, and post-event situations. Hence, the present series of studies was designed to provide a descriptive database on the relationship between emotions, especially anger, and athletic performance.

1.5 The aims of the present study

The overall purpose of the present study was to investigate anger and other performance-related emotional states in highly skilled karate athletes. Specifically, the study examined (1) the intensity of anger prior to, during, and after athletes' best and worst performances, (2) the content of anger and other performance-related states prior to, during, and after athletes' best and worst performances, (3) the perceived functional impact of anger on karate performance and (4) athletes' perceptions of their optimal performance states. Thus, on the basis of the theoretical frameworks proposed by Hanin (1997, 2000, 2003, 2004), Lazarus (1991, 2000) and the results of several IZOF-based studies (Hanin, 1978, 1986, 1989, 1995, 1997; Hanin & Stambulova, 2002; Hanin & Syrjä 1995a, 1995b, Robazza, Bortoli, & Nougier, 1998; Syrjä, 2000) the following research questions and hypothesis were formulated:

- 1 *What are the levels of optimal and dysfunctional intensity of anger states reported by karate athletes prior to, during, and after best and worst performances? What intra-individual dynamics exist across these performance situations? To what extent are anger intensity levels similar/different among athletes?* (Studies I, II, III)

Previous IZOF-based studies of anxiety (Hanin, 1978, 1986, 1989, 1995, 1997) and positive and negative emotions (Hanin & Syrjä, 1995a, 1995b, 1996; Syrjä, 2000) have indicated that optimal and dysfunctional intensity zones can be low, moderate or high, and vary for the same and across different athletes. Thus, high individual variability in anger intensity was expected.

- 2 *What is the content of metaphoric descriptions of athletes' states prior to, during, and after their best and worst performances? What is the content of athlete-generated descriptors of anger prior to, during, and after the athletes' best and worst performances? To what extent is the content of descriptors of anger and other states similar/different across contexts and performance situations, at the intra-individual and inter-individual levels? What are the causes of anger in karate performance? Do anger descriptors in sport settings differ from those in general (non-sport) settings? (Studies II, III)*

Metaphoric descriptions of athletes' states were expected to include a wide range of positive and negative emotions, not being limited to emotion content. According to the assumptions of the IZOF model (Hanin, 1997, 2000, 2003), and the results of earlier studies (Hanin & Stambulova, 2002; Hanin & Syrjä 1995a, 1995b; Robazza et al., 2000; Syrjä, 2000), there is high inter-individual variability in emotion content. Moreover, given that situations prior to (anticipation), during (task-execution), and after (evaluation) performance are interrelated but functionally different (Hanin, 2000), and a change in appraisals determines a change in emotions (Lazarus 1991, 2000), variations in emotion content across these performance situations were expected. Most previous research has focused on pre-performance situations (i.e., pre-competitive anxiety); hence, the present study extends the analysis to the temporal dimension.

The small amount of prior research conducted on experiences of anger in samples of athletes also makes the present investigation an extension of the study of performance-related states. On the basis of the notion that emotion content is context-specific, differences in anger content were expected in high achieving and general settings.

- 3 *What is the functional impact of anger on performance as perceived by athletes? Is the perceived meaning of anger related to the constructs of energy mobilization and energy utilization? (Studies I, III)*

The IZOF model states that the perceived meaning of the impact of emotions on performance is related to the constructs of energy mobilization (energizing/de-energizing effects) and energy utilization (organizing/disorganizing effects). Research on ice-hockey players (Hanin & Syrjä, 1995a) provides initial support for the validity of these functional constructs. Thus the functional impact of anger was expected to be related to such constructs.

- 4 *What are the athletes' perceptions of their optimal performance states? Do athletes' self-perceptions include unpleasant states (i.e., anger)? Are athletes' descriptors of their states related to all seven components of a psychobiosocial state? (Study IV)*

According to the IZOF model, optimal emotions are defined as the "most relevant and appropriate for a particular athlete performing a specific task" (Hanin, 2004). Thus, an optimal performance state is expected to include both

positive and negative emotions that result in total task-involvement and the best recruitment and utilization of the resources available (Hanin, 2000, 2004). Given that an athlete's psychobiosocial state manifests itself in seven interrelated form components: cognitive, affective, motivational, bodily, kinesthetic, operational, and communicative (Hanin, 1997, 2000), athletes' descriptions of their states were expected to have connotations with these components.

2 METHODS

2.1 Participants

The participants in this investigation were a total of 107 highly experienced and skillful Spanish karate athletes competing in kumite and kata. Specifically, 20 athletes (mean age=24.95, SD=5.13) participated in the assessment of anger intensity prior to, during, and after their best and worst performances using a standardized anger scale, the STAXI-2 (Study I). Sixteen athletes (mean age=19.69, SD=3.93) took part in the metaphoric description and individualized emotion and anger profiling (Study II). All the athletes were contacted 5 months afterwards for a follow-up study of the stability and consistency of the metaphors; however, only 12 athletes were available at that time. Forty-three athletes (mean age=19.26, SD=3.11) participated in the idiosyncratic description of anger states (Study III). Twelve of these athletes had also taken part in Study II. Sixty-three competitors (mean age=16.97, SD=2.68) participated in the study of athletes' optimal performance states (Study IV). Eighteen of these athletes had also participated in Study III, and four participated in Studies II and III. Figure 1 presents the demographic data on the athletes together with the methods of assessment, and procedures used in the four sub-studies included in this dissertation.

2.2 Assessment methods

This section presents an overall description of the methods of assessment used. More detailed information of these methods and reliability scores are presented in the original articles.

In contrast to the direct method (see section 1.3 page 16 for limitations of this procedure), focused recall was used in the assessment of subjective experiences prior to, during and after performance.

2.2.1 State-Trait Anger Inventory-2 (STAXI-2)

A Spanish version of the revised STAXI-2 (Miguel-Tobal, Casado, Cano-Vindel, & Spielberger 2001; Spielberger, 1999) was used to assess the experience, expression and control of anger. The 49-item Spanish inventory consists of six major scales, five subscales, and an anger expression index that provides an overall measure of the total expression of anger. The State Anger scale, which assesses the intensity of anger as an emotional state, consists of three subscales: feeling angry, feeling like expressing anger verbally, and feeling like expressing anger physically. The Trait Anger scale that assesses how frequently a person experiences anger comprises two subscales: angry reaction and angry temperament. The Anger Expression scale measures the expression of anger toward other persons (Anger Expression-Out), and the suppression of angry feelings (Anger Expression-In). Finally, the Anger Control scale measures the control of angry feelings by preventing their expression toward other persons or objects (Anger Control-Out) and the control of suppressed angry feelings by calming down (Anger Control-In).

2.2.2 Metaphor-Generation Method

The metaphor-generation method (Hanin, 2000, Hanin & Stambulova, 2002) is a holistic and idiographic approach to the symbolic representation of athletes' performance-related states. The instrument consists of open-ended incomplete sentences and paraphrases for the identification of metaphors and accompanying interpretative descriptors of feeling states prior to, during and after athletes' best and worst performances. An example of an athletes' metaphor profile is presented in Appendix 1.

2.2.3 Individualized Emotion Profiling

Individualized emotion profiling (Hanin, 1997, 2000) is an individual-oriented and task-specific measure that identifies:

- (a) individually relevant emotion content,
- (b) individually optimal and dysfunctional emotion intensity,
- (c) individually relevant context, and
- (d) the interaction effects of optimal and dysfunctional emotions.

Specifically, athletes generate idiosyncratic emotion descriptors that best describe their optimal and dysfunctional emotional experiences accompanying their best and worst performances. A stimulus list of positive and negative emotion words compiled from existing emotion scales is provided to help athletes in generating emotion descriptors.

The intensity of each athlete-generated emotion descriptor is then measured on a modified version of the Borg's Category Ratio (CR-10) scale

(Borg, 1982; Hanin, Syrjä, 1995a, 1995b) with the following verbal anchors: 0=nothing at all, 0.5=very, very little, 1=very little, 2=little, 3=moderately, 5=much, 7=very much, 10=very, very much, ● =maximal possible (no verbal anchors were used for 4, 6, 8, and 9). The CR-10 scale was constructed to avoid floor and ceiling effects. Reliability scores for idiosyncratic emotion scales ranging from .54 to .90 have been reported in soccer players (Hanin & Syrjä, 1996). An example of emotion profile is presented in Appendix 2.

2.2.4 Individualized Anger Profiling

Similar to individualized emotion profiling, individually relevant anger content was identified using a stimulus list of anger descriptors (see Appendix 2). An anger stimulus list was compiled from existing standardized scales containing items related to anger and several synonyms. The selected words were categorized as of low, moderate or high intensity according to the “item-intensity specificity” concept (Spielberger, 1970). The optimal and dysfunctional intensity of each athlete-generated anger descriptor was assessed on the modified Borg’s Category Ratio (CR-10) scale.

2.2.5 Individual Interviews

A semi-structured interview guide was elaborated to assess athletes’ optimal states using the following three types of open-ended questions proposed by Spradley (1979): descriptive questions that elicited information about athletes’ experiences, structural questions that asked about athletes’ use of their knowledge and/or experiences, and contrast questions that were used to examine the relations, similarities-dissimilarities between situations, or states.

2.3 Procedure

The president of the Spanish Federation and different coaches from regional federations provided input on the availability of the athletes, contact information, dates of training camps and other pertinent information. Data collection took place at training camps and at various training facilities. Questionnaire data from 29 athletes (Study IV) were collected by the coach at a training camp for young elite athletes. The rest of the data were collected by the author, a former karate competitor in both kumite and kata. This generated great empathy and enabled the use of specific terminologies and idiosyncrasies associated with karate. The data collection was prefaced by a brief explanation of the purpose of the study and the methods of assessment to be used. After emphasizing to the athletes that their participation was voluntary, an informed consent was obtained. The instruments were administered on site in quiet situations.

2.4 Data Analysis: General Procedure

In general, the qualitative data generated in this study, including interview data and athletes' responses or comments, were transcribed verbatim. Idiographic (metaphor and emotion) profiles were elaborated for each athlete (Studies II, III). The magnitude of the similarity-dissimilarity between athlete-generated metaphors and emotion descriptors (Studies II, III) was established by calculating a content overlap using the following formula proposed by Krahé (1986):

$$\text{overlap (i, j)} = \frac{nc(i, j)}{\sqrt{n(i) \times n(j)}}$$

where overlap (i, j) =similarity between i and j; $nc(i, j)$ =number of shared (similar) features for conditions i and j; $n(i)$ =number of features for condition i; $n(j)$ =number of features for condition j. Overlap scores range from 0 (all features are different), to 1.0 (all features are similar).

This formula, initially proposed to establish patterns of similarity between individual's perceptions of situations, has been applied to comparisons of emotions (Hanin, 1997; Hanin, Jokela & Syrjä, 1998; Hanin & Syrjä, 1995a, 1995b) and metaphoric descriptions (Hanin & Stambulova, 2002). Specifically, emotion descriptors were compiled for each of the following categories: P+, N+, P-, N-, P+N+, P-N-, and P+N+P-N- and contrasted at intra-individual and inter-individual levels. Athlete-generated metaphors were compiled and contrasted for prior to, during, and after best and worst performances across all athletes.

For instance, as the emotion profile presented in Appendix 2 shows in her best performance, this athlete selected 4 P+ descriptors prior to performance and 4 completely different P+ descriptors during performance, which means zero overlap. However, the same athlete selected the descriptor "dynamic" during her best and also during her worst performances, which results in an overlap of .22 (1 shared item, 4 P+ and 5 P- descriptors). Tables 2 and 3 present the overlap scores for intra-individual comparisons of emotion descriptors between and within contexts for the same athlete.

On the basis of the IZOF model, the content analysis of athletes' responses used the concepts of resources recruitment and utilization (Studies I to IV), seven components of performance states (Studies I, II, IV), strengths –weakness, and the IZOF-emotion iceberg profile (Study II).

The quantitative data generated in this study was analyzed using parametric as well as non-parametric tests. The parametric tests were two-way (Competition * Situation) Analysis of Variance, used to calculate the statistical significance of anger intensity for pre-, mid-, and post-best and worst performances, and Person's correlation coefficients, calculated to examine the relation between scores on the Anger-State, Trait and Expression subscales of the STAXI-2 (Study I).

The non-parametric tests were: (a) Chi Square, used in comparisons of the content of metaphors generated prior to, during, and after best and worst performances (Study II) and (b) Friedman's Two-way Analysis of Variance by Ranks, used for intra-individual comparisons in emotion intensity across the three performance situations in best and worst performances (Study III).

In addition, hierarchical cluster analysis, as a statistical method of agglomeration was used to identify relatively homogenous groups of anger intensity scores (Study IV). Among the different algorithms that can be used to combine clusters, Ward's method, which uses an analysis of variance approach, was considered the most appropriate as it minimizes the Sum of Squares.

3 OVERVIEW OF THE ORIGINAL STUDIES

Study I

Montse C. Ruiz, & Yuri L. Hanin (under review). Performance-related anger in skilled karate athletes: An extension of the IZOF model. *Journal of Sport and Exercise Psychology*.

The first study examined anger and anger-related symptoms in 20 highly-skilled karate athletes. The intensity of anger prior to, during, and after athletes' best and worst performances was measured with the STAXI-2. The perceived functional impact of anger on performance and the trait, expression and control of anger were also explored. In addition, the study examined athletes' perceptions of their states in each individually relevant situation. It was hypothesized that great variability would be found in the intensity of anger states. Moreover, optimal and dysfunctional levels of intensity of anger were expected to be low, moderate or high in different athletes. It was further hypothesized that the facilitating effects of anger on performance would be related to the availability of resources and their efficient utilization whereas debilitating effects would be related to a lack of resources and/or their inefficient utilization.

Analysis of anger intensity prior to, during, and after best and worst competitions revealed different types of response characterized by low, moderate or high intensity. Table 4 presents descriptive data for the intensity of anger prior to, during and after best and worst performances. As the table shows, large inter-individual differences in situational anger, especially in unsuccessful competitions were found (standard deviations ranged from 3.9 to 11.7). Results from a two-way ANOVA within-subjects design indicated significant competition effects ($F_{(1,19)}=15.582$, $p =0.001$), and the effects of interaction between competitions and situations ($F_{(2,38)}=3.813$, $p =0.031$) on anger intensity.

It was revealed that in best performances, the intensity of State Anger correlated negatively with Anger Control-In in prior to, during, and after performance situations. Moreover, significant positive correlations were found

between State Anger and Anger Expression-Out in mid-event, and between State Anger and the anger expression (AX) index in pre- and mid-event situations. In contrast, in worst performances, moderate positive correlations were found between State Anger and Trait Anger and between State Anger and Anger Expression-Out in pre- and post-event situations.

Analysis of the impact of anger upon performance indicated that perceived facilitating effects were related to the generation of additional energy, and the effective utilization of energy. However, athletes also perceived anger as having debilitating effects on their performance in terms of experiencing a lack of energy or resources, and an ineffective recruitment and utilization of resources.

The findings also revealed that the content of athletes' self-perceptions of their states prior to, during, and after their best and worst performances had multiple connotations with different components of a performance state. Specifically, cognitive and affective components were the most salient in both competitions, while connotations with a kinesthetic component were less frequent.

Study II

Montse C. Ruiz, & Yuri L. Hanin (2004). Metaphoric description and individualized emotion profiling of performance states in top karate athletes. *Journal of Applied Sport Psychology*, 16, (3), pp 258-273.

The purpose of the second study was to examine performance-related states prior to, during, and after best and worst competitions in 16 highly-skilled karate athletes using a metaphor-generation method and individualized emotion profiling. Based on individual-oriented and phenomenological approaches, this study emphasized the importance of examining athlete's descriptions and the personal significance of their states. Overall, it was hypothesized that metaphoric descriptions would be idiosyncratic, holistic and action-oriented, reflecting high or low readiness for action. Metaphors prior to, during, and after performances were expected to be different. The content of the metaphoric descriptions was also expected to be related to the different components of the performance psychobiosocial state. It was predicted that the content of state descriptors would form an IZOF-iceberg profile (predominance of optimal (P+ and N+) emotions) in best performances, and a flattened profile (predominance of dysfunctional (P- or N-) emotions) in worst performances. The stability of the symbolic images was examined after 5 months. Finally, athlete-generated emotion descriptors were contrasted with Lazarus' (1991, 2000) list of 15 basic emotions and core relational themes.

The findings indicated that all the athletes were able to generate metaphors to symbolically describe their performance states. As expected, athlete-generated metaphors were highly idiosyncratic. Inductive content analysis of the metaphors revealed 7 categories of animate (animals, human beings and mythical characters) and inanimate (objects, vehicles, natural

phenomena and plants) agents. Comparisons of the similarity-dissimilarity of metaphors for the entire sample revealed a low content overlap both within best and worst performances (ranging from .06 to .15) and between best and worst performances (from 0 to .18). As expected, the athlete-generated metaphors were action-oriented and reflected action tendencies. Characteristics of metaphors in best competitions were high action tendencies (“matador before the kill”), strengths (“a steam roller”), available resources or ability to recruit resources (“pylon”) and effective utilization of resources (“lion after its prey”). In contrast, metaphors in worst competitions reflected low action tendencies (“a stone”), weaknesses (“David against Goliath”), a lack of resources or inability to recruit resources (“a bird with no wings”), and ineffective utilization of resources (“an octopus in a dessert”). Athletes’ metaphoric descriptions were holistic and multidimensional having connotations with the cognitive (“*focused*”), affective (“*euphoric*”), motivational (“*willing, eager*”), bodily (“*strong*”), kinesthetic (“*bad muscular sensations*”) and operational (“*could not get the rhythm of the combat*”) components of a psychobiosocial state. However, no connotations with a communicative component were found in the athletes’ descriptions. As predicted, the visual representation of the frequency of the content of state descriptors in best performances formed a typical IZOF-iceberg profile, in which optimal emotions (located in the middle) predominated, with low frequencies of dysfunctional emotions (located at the sides). A flattened negatively skewed profile with a predominance of dysfunctional negative emotions and low frequencies of dysfunctional positive and optimal emotions was obtained for state descriptors in worst performances.

Analysis of the stability and perceived meaning of the athlete-generated symbolic images in a follow-up study (N=12) indicated that most of the metaphors describing the athletes’ states were retained after a 5-month interval. Only two athletes changed their original metaphors and generated new ones. These changes, however, were related to a different personal meaning of the situation.

Comparisons of the athlete-generated emotion descriptors with the 15 basic emotions proposed by Lazarus (1991, 2000) revealed a mismatch. In best performances, athletes’ subjective experiences were similar to three basic positive emotions (happiness, pride, and relief) and four negative emotions (anger, anxiety, sadness and shame). In worst performances, athletes’ self-generated words described the same basic emotions experienced in best performances as well as fright. However, none of the athletes generated items describing love, hope, compassion, gratitude, envy, jealousy or guilt, all of which are in Lazarus’ list. The present results revealed that the athletes generated non-emotion labels to describe their states in both best (50%) and worst (55.8%) competitions.

Study III

Montse C. Ruiz & Yuri L. Hanin (2004). Idiosyncratic description of anger states in skilled Spanish karate athletes: An application of the IZOF model." *Revista de Psicología del Deporte* 13 (1), pp. 75-93

The third study examined performance-related anger states prior to, during, and after best and worst competitions in 43 highly-skilled karate athletes from an individual-oriented perspective. The study focused on the content and intensity of anger states and athletes' perceptions of the functional impact of anger on performance. It was hypothesized that the content of such experiences would be highly idiosyncratic and that athletes would use different emotion words to describe their states across competitions and performance situations. In contrast to the nomothetic approach that emphasizes the existence of universal and similar optimal levels of intensity for all athletes, in this study it was hypothesized that optimal and dysfunctional intensity levels would be highly individual, and would be high, moderate, or low. In this study, the intensity of anger states was not only quantitatively, but also qualitatively assessed using the concept of item-intensity specificity proposed by Spielberger (1970). Moreover, it was expected that the resources-matching hypothesis would explain the functional impact of emotion upon performance. Reasons for anger related to performance and other anger experiences in general settings were also examined.

Analysis of the content of anger descriptors at the individual level, indicated that the athlete-generated items were different across contexts (overlap scores ranging from .11 to .24) as well as across performance situations (from 0 to .35). Similarly, inter-individual analysis of anger content indicated a low overlap in best (from 0.05 to 0.16) and worst (from .07 to 0.19) competitions. As expected, anger intensity was either low (ranging from 0 to 3 on the CR-10 scale), moderate (from 4 to 7), or high (from 8 to 11) across the performance situations, with mainly moderate or high intensity reported during and after worst performances. In best performances, the intensity of anger at the intra-individual level, either increased or decreased from pre- to mid-event situations, and decreased from mid- to post-event situations for most athletes. In contrast, in worst performances, anger intensity mostly increased or remained unchanged from pre- to mid-event situations and increased from mid- to post-event situations. As table 4 shows, high inter-individual variability was found across prior to, during, and after-performance situations (standard deviations ranging from 2.7 to 4).

The qualitative analysis of anger intensity indicated that athletes more frequently used "strong" items (e.g., "aggressive" [agresivo]) to describe their pre- and mid-event states, whereas "weak" items (e.g., "bothered" [fastidiado]) were more often used in worst performance situations. Content analysis of the perceived functional impact of anger on performance indicated that anger was actively used by some coaches or athletes in preparing for the competition. The facilitating effects of anger on performance were mainly related to the

generation of additional energy (i.e., being motivated, having increased confidence, performing powerfully and rapidly, and going on the attack more). However, anger states which were related to other negative feelings (i.e., tension, lack of confidence) were also perceived as debilitating and reflected a lack of readiness to perform, a perceived inability to cope with the situation and the ineffective utilization of resources (i.e., poor technical performance, ineffective focus). Content analysis revealed that among the causes of anger were referees' or opponents actions, performing badly, not being prepared, and not being able to achieve the goals set. Athletes' reasons for anger also included mixed feelings of shame, guilt, anxiety and envy. In the case of kumite competitors, anger was either directed at others or self-directed. In contrast, kata athletes directed their anger mainly at themselves. The results also revealed a low content overlap between words describing anger states in general (non-sport settings) compared to best performances (mean overlap 0.24, SD=0.23) and worst performances (mean overlap 0.29, SD=0.22).

Study IV

Montse C. Ruiz & Yuri L. Hanin (in press). Athletes' self perceptions of optimal states in karate: An application of the IZOF model. *Revista de Psicología del Deporte*

This study, based on phenomenological and individualized perspectives, aimed at examining the perceptions of optimal performance states in 63 highly-skilled karate competitors. The focus was on the content, form and temporal dimensions of such optimal states. It was predicted that optimal states would include positive as well as negative emotional experiences, reflecting athletes' idiosyncratic strategies to recruit and utilize their individual resources. The existence of relatively stable emotional patterns and meta-experiences was also explored.

Content analysis indicated that athletes' descriptions of their optimal states included positively-toned (i.e., feeling confident, certain, optimistic) as well as negatively-toned (i.e., being nervous or anxious, and angry) states. Athletes' optimal states were perceived as dynamic, not lasting longer than the competition in most cases. Athletes' descriptions revealed not only emotional experiences, but also emotional patterns, as well as meta-experiences (knowledge, attitudes). Athletes' meta-experiences were also reflected in their awareness of the barriers to an optimal state and the strategies they could use to enter or re-enter the state. Factors hindering athletes' optimal states were related to performance and included performing poorly, evaluation from significant others and refereeing. Moreover, the results indicated that athletes' performance-related states clearly reflected a lack of resources (i.e., mental or physical) and poor or ineffective utilization of these resources. The strategies used by the athletes to prepare for and enter their optimal state included focusing, practicing specific karate techniques, increasing their energy or motivation, regulating their anxiety, enhancing their confidence, visualization

and having a clear picture of what to do. Strategies used to re-enter their optimal state included re-focusing, avoiding distractions, psyching up, positive thinking and energy regulation. Sometimes, negative states such as anger were also used by the athletes to re-enter their optimal state. However, the results also indicated that the strategies used by the athletes in the regulation of negative emotions (i.e., anger, anxiety, fear of losing, or sadness) were sometimes ineffective, especially prior to and during performances. Situations in which a lack of resources or inability to recruit resources were perceived (i.e., feeling unable to focus, too anxious, or being unable to beat one's opponent) as well as the ineffective or poor utilization of their resources (i.e., performing poorly) were the situations that athletes found it especially difficult to control.

The results indicated that athletes' perceptions of their optimal states had connotations with all the components of a psychobiosocial state. Cognitive ("*focused, not getting distracted*") and affective ("*confident, certain, optimistic, superior*") were the most often mentioned in athletes' descriptions of their optimal states (57%), whereas communicative ("*supported by others*") (2.4%) and kinesthetic ("*agile, smooth, light*") (6%) components were less often mentioned.

4 GENERAL DISCUSSION

4.1 Main findings

The series of studies included in this investigation examined anger and other performance-related states in highly-skilled karate athletes focusing, on the intensity, content, and functional impact on performance in two contexts (best and worst competitions). In Study I, the intensity of anger states prior to, during and after their best and worst performances, as well as the trait, expression and control of anger were examined in 20 athletes using a standardized anger scale, STAXI-2. The functional impact of anger on performance and athletes' perceptions of their states in significant performance situations were also examined. In Study II, feeling states were examined in 16 athletes prior to, during and after their best and worst competitions using two individualized approaches, the metaphor-generation method and individualized emotion profiling, which examined the content and intensity of athletes' performance-related states. In Study III, the content and intensity of anger and other positive and negative states in 43 athletes were examined using individualized emotion profiling. The functional impact of anger on performance was also explored. In Study IV, athletes' perceptions of their optimal performance states as well as their emotional patterns and meta-experiences were investigated in 63 athletes using questionnaires and individual interviews. The findings will be discussed according to the intensity and content dimensions of a performance state and perceived impact on performance.

As expected, large inter-individual variability in optimal and dysfunctional intensities of anger was found. Thus, irrespective of the method used, STAXI-2 or individualized anger profiling, the results indicated that different athletes performed successfully or unsuccessfully while experiencing high, moderate, or low levels of anger. These results accord well with earlier IZOF-based research on anxiety as a discrete stress-related emotion (Hanin, 1978, 1986, 1995; Pons, 1994; Raglin, 1992; Raglin & Hanin, 2000) and other positive and negative emotions (Hanin, 1997, 2000; Hanin & Syrjä 1995a, 1995b; Syrjä, 2000). The findings also support the notion of "specific optimal effect"

levels or zones, suggested by Hanin (1995, 1997), as more appropriate for the description and explanation of anger-performance relationships, rather than the universal average or individually unspecified optimal intensities proposed for arousal or anxiety, for instance.

Moreover, these findings contrast with earlier nomothetic assumptions suggesting that low anger intensities are related to successful athletic performance (Morgan, 1985), and accord well with previous studies indicating that high anger intensities are also related to successful performance in karate (McGowan & Miller, 1989; McGowan, Miller, & Henschen, 1990; Terry & Slade, 1995) and judo (Arruza, et al., 1998).

In this study the intensity of anger was assessed quantitatively and qualitatively by applying the concept of item-intensity specificity (Spielberger, 1970) in the construction of the anger stimulus list. Thus, the stimulus list included different items, which were effective when measuring high, moderate or low intensities of anger. Interestingly, it was found that in best performances, the athletes selected a greater number of "strong" items or items with high content intensity to describe their experiences of anger, especially in pre- and mid-event situations. However, "weak" items or items with low content intensity were more often selected by the athletes to describe their anger states in worst competitions. Although the results do not explain why the athletes selected one kind of items rather than another, it can be suggested that such strong descriptors might imply higher tendencies for action, which are associated with successful performances. However, future studies should examine if this is the case by analyzing the meaning that each athlete-generated descriptor has for the individual.

Athletes' states related to their successful and unsuccessful performances were not limited to a single discrete emotion, anger. As predicted, the athletes experienced a constellation of positive and negative emotional experiences. Thus, in best performances, athlete-generated metaphors describing their states were related to three positively toned emotions such as happiness, pride and relief, and four negatively toned emotions such as anger, anxiety, sadness and shame. In worst performances, athletes described the same emotions, including fright, although in different performance situations. Thus, while some athletes experienced happiness, for instance, after their best performances, the same emotion was sometimes experienced prior to athletes' worst competitions. These results revealed a relative mismatch between the present athlete-generated emotions and the 15 basic emotions described by Lazarus (2000), indicating that the content of emotions in high achievement sports is context-specific. Thus, it can be suggested that Lazarus' list appears to be a more general list of emotions that individuals might experience in different contexts.

The context specificity of emotion content proposed within the framework of the IZOF model (1997, 2000) was also supported by the low overlap between the content of metaphors and emotion descriptors generated for best and worst performances. Moreover, low overlap was found between the content of athlete-generated anger descriptors related to best and worst performances and

anger states in general (non-sport) situations. Specifically, athletes used descriptors with higher content intensity in performance-related situations, whereas items with low or moderate content intensity were used to describe athletes' typical (non-sport) angry states.

As hypothesized, emotion content was very dynamic, as reflected in the low overlap found for metaphors and emotion descriptors generated to describe athletes' states prior to, during and after performance situations at individual (i.e., Tables 2 and 3) and group levels. These findings provide empirical support for the notion that the three stages of the performance process, prior to (anticipation of), during (task-execution), and after (evaluation of) performance, are interrelated but functionally different (Hanin, 2000). However, it was also observed that at intra-individual levels, overlap scores of emotion descriptors prior to and during performances were slightly higher than between mid- and post-event, or pre- and post-event situations. These results, which indicate smaller differences in the content of emotions from pre- to mid-performance situations, might be explained by the short duration of karate events. The results, which accord well with the notion that emotion is a process that unfolds over time (Lazarus, 1991, 2000), might be explained by changes in appraisals of anticipated (prior to performance) or occurred (during and after performance) gains and losses that might trigger the different meaning of these situations or by changes in the task-demands or in the perception of the resources available.

At the inter-individual level, it was revealed that different athletes used very different metaphors and emotion words to describe their states related to their best and worst performances. The results accord well with previous studies indicating high variability in emotion content (Hanin & Stambulova, 2002; Hanin & Syrjä 1995a, 1995b; Robazza et al., 2000; Syrjä, 2000) suggesting that the vocabulary athletes use to describe their own emotions is highly idiosyncratic. Furthermore, this finding calls into question the use of standardized scales with researcher-generated items, which might not be appropriate to capture individually relevant emotion content.

The athletes identified different causes for anger in karate, which were related to their own performance or the interaction with significant others, such as referees' mistakes or actions by opponents' perceived as unfair. These results support Lazarus' (1991, 2000) notion that emotions are the result of a constantly changing person-environment relationship. Moreover, anger was mainly directed towards others in the case of kumite competitors and self-directed in the case of kata competitors. These findings accord well with the notion that anger is an interpersonal emotion (Averill, 1983). The differences in the direction of anger might be explained by the nature of kumite that involves the presence of a real adversary, and kata that does not. The results also emphasize the need of examining the context dimension, which involves environmental (situational, interpersonal, intra-group) factors (Hanin, 2000).

An idiosyncratic perception of the impact of anger on performance was found. As expected, the athletes perceived different levels of anger intensity as

facilitative for their performance in terms of effective generation of energy. However, anger was also experienced as a result of a lack of readiness to perform. Some athletes perceived anger as debilitating for performance, affecting the effective utilization of their resources. These results accord well with previous studies on facilitative and debilitating effects of positive and negative emotions (Hanin and Syrjä, 1995a; Syrjä, 2000) and provide support for the constructs of energy mobilization and energy utilization proposed within the framework of the IZOF model (Hanin, 2000). Thus, it seems that anger has a compensatory effect aiding in the generation of additional energy or enhanced effort, when a mismatch between the athletes' resources and the task demands is perceived. The relation between mood and effort mobilization, as measured by cardiovascular response is also described in a study by Gendolla and Krüsken (2002) who found that mood (i.e., negative) influences appraisals of the task demands (i.e., perceived as more difficult) which determine the amount of effort mobilized (high with contingent positive consequences of performance).

Moreover, the results indicated that anger had a mediating effect on other modalities of a performance state such as motivation and concentration as well as on performance itself (technique, tactics, etc). These results suggest the importance of distinguishing between the hedonic tone (pleasant and unpleasant) and functionality (optimal and dysfunctional) of performance-related states, distinction considered within the framework of four emotion categories (P+,N+,P- and N-) proposed in the IZOF model to conceptualize emotion content.

As predicted, athletes' optimal states included positive (i.e., highly concentrated, motivated, confident), and negative (i.e., angry, anxious) experiences. The athletes perceived their optimal states as temporary and dynamic and showed their awareness of the need to enter and re-enter such states. Negatively toned states, such as situational anger, helped some athletes to enter and re-enter their optimal states by providing them with additional energy. These results support the notion that optimal states are the most relevant and appropriate states for a particular athlete performing a specific task (Hanin, 2000, 2004), and distinguish this concept from others, such as peak experiences (Privette, 1981, 1982; Ravizza, 1977, 1984), flow states (Csikszentmihalyi, 1975, 1990), or ideal performance states (Loehr, 1982; Uneståhl, 1986), which are characterized by positive experiences only.

Athletes' perceptions of their optimal states reflected emotional experiences, relatively stable patterns and meta-experiences. Experiencing anxiety prior to performance was perceived as debilitating and something that had to be coped with (meta-experience), while anxiety, mixed with feelings of confidence during competition was perceived motivating and facilitating for performance. These results support the distinction between the three kinds of emotional experiences proposed within the framework of the IZOF model (Hanin, 2003). It can be suggested that examining athletes' perceptions of their performance-related states has a crucial role in explaining the emotion-performance relationship. The findings also support Hanin's (2000) suggestion

that the interacting effects of performance-related emotions, which are especially important in the prediction of performance, deserve to be considered.

Finally, athletes' descriptions of their states were not limited to emotion content. It was revealed that athletes' states were manifested in cognitive, affective, motivational, bodily, kinesthetic, operational and communicative components of a psychobiosocial state as proposed in the IZOF model (Hanin, 1997, 2000). Athletes' descriptions had more connotations with cognitive and affective components whereas communicative and kinesthetic components seemed to play a less important role. While the nature of karate as an individual sport might explain why a communicative component was not so often reported, it is possible that cognitive and affective components are more emphasized by coaches or the athletes, thereby becoming part of their vocabularies. Thus, these results support the multidimensional description of performance-related psychobiosocial states proposed in the IZOF model.

4.2 Methodological considerations

The strengths as well as the limitations of this study lie in the use of recalled measures. Typically, athletes' subjective emotional experiences and the impact they have on performance were assessed using direct self-reports. While these measures are simple, brief, and relatively quick to administer and score (Hanin & Syrjä, 1996), they are limited (see section 1.3 page 16). Thus, a recall method was thought to be appropriate for the examination of performance-related states prior to, during and after athletes' best and worst performances, providing information about the most significant aspects of athletes' past performance history. The high accuracy and reliability of recall measures for emotion descriptors has been well documented (see Jokela & Hanin, 1999 for a meta-analysis, and Raglin & Hanin, 2000).

In this study, individualized and phenomenological perspectives were taken. It was assumed that highly skilled athletes with impressive sporting experiences would be aware of their experiences given the repetitive nature of the competition context, which offers them the opportunity to reflect upon and evaluate such experiences constantly. Thus, athletes' descriptions of their performance-related experiences had high face validity and credibility. The use of interview techniques provided information not only about their emotional experiences and optimal and dysfunctional patterns but also about their attitudes or beliefs concerning their own emotions. Moreover, a qualitative approach allowed the examination of athletes' appraisals and coping strategies, useful in the study of the impact of emotional experiences upon performance.

Two different approaches were used in the study of athletes' anger experiences. The first approach consisted in the measurement of anger using a reliable and valid standardized scale, the STAXI-2. This scale, borrowed from general psychology, provided valuable information about the specifics of anger.

Thus, rather than being an index of global anger, the STAXI-2 was developed within a multidimensional conceptualization, thereby examining different components of anger, such as the experience, disposition, expression and control. However, the STAXI-2 that was useful in the assessment of optimal and dysfunctional anger intensity was limited in that it included “fixed” or researcher-generated content of anger. Previous studies (Syrjä & Hanin, 1997a, 1997b; Hanin, Jokela, & Syrjä, 1998; Robazza, Bortoli, Nocini, Moser, & Arslan, 2000) have revealed a discrepancy between the content of items included in standardized scales (with researcher-generated items), and the vocabulary used by the athletes (athlete-generated items). Thus, an individual-oriented approach was taken by using individualized emotion and anger profiling, which examined the intensity as well as content of emotions using a stimulus list. In fact, low content overlap was found between the items contained in the State Anger subscale of the STAXI-2 and the athlete-generated anger items in best (mean overlap scores ranging from 0.02 to 0.09) and worst performances (from 0.06 to 0.2).

Traditionally, measures of athletes’ emotional experiences are limited to a selected number of emotions. However, this limitation was overcome in the present study by using a holistic approach. Thus, by generating metaphors, the athletes were able to describe a wide range of positive and negative emotional experiences related to their successful and unsuccessful performances. This methodology also provided important functional relevant information related to the description of athletes’ action-oriented tendencies, which typically are not included in other self-report scales. Moreover, the focus of most measures of athletes’ subjective emotional experiences is on the affective modality. This limitation was also overcome by the use of metaphoric descriptions that allowed the examination of several modalities of performance-related psychobiosocial states, which included emotion and non-emotion content.

The methods used in this study, specifically the metaphor-generation method and individualized emotion profiling, made it possible to investigate the changes in the content of emotions across the, rarely examined, temporal dimension (Hanin & Stambulova, 2002; Syrjä, 2000). Both methods have been useful in capturing the athlete’s perspective and personally meaningful vocabulary, which is essential in individualized interventions. Furthermore, individualized emotion profiling, which uses hedonic tone and functionality distinctions to categorize emotion content into P+, N+, P-, and N- emotions, was a useful way of accommodating athlete-generated emotion labels, which were later re-categorized using a discrete emotion framework, such as Lazarus’ list of 15 basic emotions.

An important factor in the development of measures of athletes’ emotional experiences and meta-experiences is context-specificity. Although, this investigation was not aimed at the construction of an anger scale specific to sport, individualized anger profiling served to assess the intensity and content of anger including individually relevant and task-specific descriptors. Thus, and as a limitation of this study, future research should examine the validity of

such a scale. An alternative in the development of an instrument that includes individually relevant and task-specific anger content would be the aggregation of athlete-generated items to form individualized scales across different sports or tasks (i.e., competitions, training sessions).

Another limitation of the present study is that the identification of optimal and dysfunctional levels of anger was only accompanied by athletes' self-ratings of their past performances. Thus, future studies should identify both optimal and dysfunctional anger levels and the corresponding performance levels as additional criteria in examining the anger-performance relationship.

As for the generalizability of the results, it can be suggested that these results have high external validity in terms of highly-skilled Spanish karate athletes. The athletes included in this study were put forward by coaches on the basis of their skill and experience. However, the small number of athletes in some of the studies, and the differences that might exist in the way people of other cultures or subcultures (i.e., sports) experience, express and control their anger experiences need to be addressed in future studies.

4.3 Practical Implications

From the applied perspective, the findings of this investigation suggest that the functional impact of anger and other performance-related experiences is idiosyncratic, depending on individual's perceptions of the match or mismatch between their own resources and the task demands. Thus, different athletes can perceive anger as facilitating or debilitating for their performance. In clinical psychology, most programs focus on the reduction of anger by using cognitive therapies, relaxation-based therapies or skills training therapies (see Del Vecchio & O'Leary, 2004 and DiGiuseppe & Tafrate, 2003 for meta-analyses; Deffenbacher et al., 1987). In sport, it is suggested that cognitive-behavioral techniques such as assertiveness training, communication skills training, or team building could be useful to control or prevent excessive anger and aggression (Isberg, 2000). However, the results of the present investigation suggest that interventions aimed at enhancing performance should not always strive for a reduction of anger, which might be beneficial for some athletes, but not for others.

Individualized profiles of positive and negative emotions provide sport psychologists, coaches, and athletes with a valuable tool to help athletes enhance their awareness and monitor their emotions in the preparation, task-execution, and evaluation or post-recovery situations. A visual representation of individualized emotion profiles, which reflects the interacting effects of optimal and dysfunctional emotions might be useful in the prediction of performance and in the regulation of athletes' states by comparing individually optimal and dysfunctional emotions previously identified with actual states

prior to a competition. Such an idiographic profile might also be used in the post-performance analysis.

The results suggest that it is important to be sensitive to the vocabulary used by athletes as well as to their meta-experiences as this may facilitate individualized interventions. Thus, rather than changing athletes' emotional experiences, practitioners might also aim at changing dysfunctional beliefs or attitudes about athletes' emotional experiences for more optimal ones. Metaphors might be used as effective triggers in the self-regulation of performance states and psychological interventions. They also provide information about small changes in athletes' states across the temporal dimension, which might reflect their appraisals of the situation and their coping strategies. Moreover, they can be used in intervention programs, aiming not only at the affective component but also in combination with cognitive (perception of the situation, expectation of success), motivational or other (bodily response) manifestations of performance-related states.

Given that what might be optimal for an athlete prior to a competition might not be optimal during the competition (time), or that what is optimal in training might not be optimal in competitions (context), intervention programs should be based on each individual's idiosyncratic emotional experiences, meta-experiences, resources and needs. Moreover, individualized intervention or self-regulation programs should target several modalities of performance-related states, such as cognitive, bodily, or motivational modalities (Robazza, Pellizzari, & Hanin, 2004).

4.4 Future Research Directions

The results of this investigation provide a qualitative descriptive database that extends the theoretical framework of the IZOF model to the study of performance-related anger. In order to increase our knowledge of the emotion-performance relationship, future studies should now focus on the application of these findings, aiming at examining the validity and practical utility of the in-out of the zone notion as applied to anger. Thus, optimal and dysfunctional zones of anger should be established in attempts to predict performance.

Future cross-cultural studies should pay more attention to the explicit or implicit rules for experiencing anger in other cultures or subcultures (i.e., sports) and to the social and interpersonal context. The influence of the context is evident when translating the items into another language, for instance. Given that different languages have different words to express emotions, researchers should try to avoid literal translations, and look for descriptors with equivalent cultural connotations that are meaningful for the individual athletes. The study of cultural norms for displaying and regulating anger, as well as the development of athletes' beliefs or attitudes regarding their emotional experiences (meta-experience) also warrants research attention.

It is suggested that future studies on performance-related emotions should combine the assessment of different modalities of a performance state, such as cognitive, motivational or bodily modalities, rather than focus on one selected modality only, such as the affective. In the prediction of performance, it is recommended that the interacting effects of a cluster of positive and negative optimal and dysfunctional emotions be studied rather than the separate effects of a single discrete emotion. The study of post-performance emotions might also be useful in the development of intervention programs focused on recovery.

Although the advantages of the recall measures were considered to surpass the disadvantages, future studies combining recall, actual and/or predictive measures are needed to permit firmer conclusions to be drawn regarding the present findings.

4.5 Conclusions

On the basis of these results we can conclude the following:

1. Optimal and dysfunctional anger intensity levels can be low, moderate and high, depending on the individual athlete.
2. The content of anger and other positive and negative performance-related emotions is also very idiosyncratic and varies across the three performance situations and across contexts.
3. Anger can be perceived as facilitating or debilitating for performance depending on the individual athlete, and it is related to energy mobilization and organization functions. Thus, the functionality (optimal/dysfunctional) and hedonic tone (positive/negative) of experiences are independent.
4. A wide range of positive and negative emotions is related to athletes' successful and unsuccessful performances.
5. Performance-related states include emotion and non-emotion content.

TIIVISTELMÄ

Urheilijoiden suorituksen ja emootioiden tutkimus on aikaisemmin keskittynyt pääasiassa vain yhden tunteen, ahdistuneisuuden, tutkimiseen. Suurin osa suoritusta ja ahdistuneisuutta kuvaavista teorioista ja malleista on yleensä lainattu yleisestä psykologiasta, ja siten niiden lähestymistapa on usein nomoteettinen. Tällainen lähestymistapa painottaa inter-individuaalisia eroja, mikä tekee tulosten hyödyntämisen vaikeaksi yksilöurheilijoille. Niinpä tämä käsillä oleva tutkimus pohjaakin Individual Zones of Optimal Functioning –malliin (Hanin, 1997, 2000, 2003)), joka on idiografinen urheiluun keskittyvä lähestymistapa ja jonka avulla tarkasteltiin 107 espanjalaisen huippukaratekan vihantunteita ja muita emotionaalisia kokemuksia. Ensimmäiseksi tässä tutkimuksessa tarkasteltiin vihan tunteen optimaalista ja ei-optimaalista intensiteettiä parhaan ja huonoimman suorituksen yhteydessä: sitä ennen, sen aikana ja jälkeen. Tutkimus suoritettiin State-Trait Anger Inventory-2 -lomakkeen (Spielberger, 1999) ja erityisesti tätä tutkimusta varten tehdyn individuaalisen vihan tunteen profilointi -lomakkeen avulla, jossa urheilijat muistelivat jälkikäteen suorituksessa kokemaansa vihan tunnetta. Toiseksi tarkasteltiin vihan tunteen ja muiden emootioiden sisältöä ennen urheilijoiden parasta ja huonointa suoritusta, niiden aikana sekä niiden jälkeen. Näitä tarkasteltiin metaforan keksimismetodin (Hanin & Stambulova, 2002) ja individuaalisen vihan tunteen ja emootioiden jälkikäteen tapahtuvan profiloimisen (Hanin, 2000) avulla. Kolmanneksi avoimilla kysymyksillä tutkittiin urheilijoiden omia näkemyksiä siitä, millaista toiminnallista vaikutusta vihalla on suoritukseen sekä millaisia ovat urheilijoiden optimaaliset suoritustilat.

Tulokset osoittivat suurta yksilöllistä vaihtelua vihan optimaalisissa ja ei-optimaalisissa intensiteetin tasoissa, jotka olivat matalia, keskinkertaisia tai korkeita eri urheilijoilla. Urheilijoiden keksimät metaforat, jotka kuvasivat suoritukseen liittyviä tiloja, olivat hyvin individuaalisia, holistisia ja toimintaan suuntautuneita. Itse metaforien sisältö, joka koostui elollisista olennoista (eläimistä, ihmisistä, myyttisistä olennoista) ja elottomista olennoista (kulkuneuvoista, esineistä, kasveista, luonnonilmiöistä), oli hyvin erilaista ennen, jälkeen ja parhaimman tai huonoimman suorituksen aikana. Metaforat, jotka kuvasivat urheilijoiden tiloja, heijastivat korkeaa suoritusvalmiutta parhaissa suorituksissa, ja matalaa suoritusvalmiutta huonoimmissa suorituksissa. Verrattaessa urheilijoiden kertomat emootio-kuvaukset ja Lazaruksen 15 peruseemootion kategoriat eivät vastanneet täysin toisiaan, sillä urheilijat kuvasivat parhaimmissa ja huonoimmissa suorituksissa vain kolmea positiivisesti latautunutta emootiota (onnea, ylpeyttä ja helpotusta) ja viittä negatiivisesti latautunutta emootiota (vihaa, ahdistusta, surua, häpeää ja pelkoa). Emootioiden ja vihan kuvausten sisältö ennen, jälkeen sekä parhaan ja huonoimman suorituksen aikana oli myös hyvin individuaalista ja kontekstisidonnaista. Emootioiden sisällön spesifisyys korkeaa suoriutumista vaativissa tilanteissa heijastui myös matalana vastavuutena suoritusta koskevien ja urheilun ulkopuolisiin tilanteisiin liittyvien

vihan sisältöjen välillä. Vihan tilojen havaittiin parantavan tai heikentävän urheilijoiden suoritusta. Erityisesti parhaissa suorituksissa vihan tilat liitettiin lisääenergian tuottamiseen tai lisääntyneeseen yrittämiseen. Sitä vastoin huonoimmissa suorituksissa viha liitettiin energian puutteeseen, kyvyttömyyteen hyödyntää voimavaroja tai voimavarojen hyödyttömään käyttöön. Tulokset osoittivat, että urheilijoiden näkemykset omista optimaalisista tiloistaan olivat tyypillisesti positiivisia (varmuus, tyyneys), mutta myös negatiivisia (viha, ahdistus). Urheilijoiden kuvaukset heijastivat myös suhteellisen pysyviä emootioita ja meta-kokemuksia (tietoa tai uskomuksia heidän kokemuksistaan). Vaikka affektiiviset ja kognitiiviset komponentit mainittiin kaikkein useimmin, urheilijoiden itseään koskevat kuvaukset pitivät sisällään monia sivumerkityksiä kaikkien seitsemän suoriutumisen psykobiososiaalisten tilojen modaliteettien kanssa.

Kaiken kaikkiaan tulokset antoivat uutta tietoa aikaisempaan IZOF-malliin perustuvaan emootiotutkimukseen nähden, sillä tutkimus toi teoreettiseen viitekehykseen temporaalisen dimension.

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TABLE 1 Most common measures of anger in general psychology.

Scale, author, year	Description, comments
BDHI (Buss and Durkee, 1957)	75 items on a true-false format scale Measures assault, indirect and verbal hostility, irritability, negativism, resentment, suspicion and guilt Predictive validity not established, dubious reliability (Biaggio, 1980)
POMS (McNair, Lorr, & Droppleman, 1971)	65 items on a 5-point Likert scale Measures tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, confusion-bewilderment
RI (Evans & Stangeland, 1971)	76 items on a 5-point Likert scale Measures the degree of anger certain situations provoke Needs further validation (Biaggio, 1980)
ASR (Zelin, Adler & Myerson, 1972)	Likert-type 64 items scale Measures awareness, expression and condemnation of anger, guilt and mistrust Predictive and construct validity not established (Spielberger, et al., 1983)
AI (Novaco, 1975)	90 statements on a 5-point Likert scale Measures anger reactions to a wide range of provoking situations Low test-retest reliability (Biaggio, et al., 1981)
STAS (Spielberger, et al., 1983)	20-item scale Measures experience (State Anger) and disposition (Trait Anger)
AX Scale (Spielberger, et al., 1985)	20-item scale Measures anger expression (Anger-Out) and anger suppression (Anger-In) 8 items to measure control of anger
STAXI (Spielberger, 1988)	44 items on a 4-point Likert scale Combination of STAS and AX Scale to measure experience (State Anger), disposition (Trait Anger), expression (Anger-In, Anger-Out), and control of anger (Anger-Control)

TABLE 2 Overlap scores for between-context comparisons of descriptors for an athlete

Performance situations	Emotion categories		
	P+/P-	N+/N-	P+N+/P-N-
Best vs. Worst performance			
Before	0	.27	.17
During	.22	0	.11
After	.25	0	.10

Note. A+ descriptors included in the category of N+ and A- included in N-

TABLE 3 Overlap scores for within-context comparisons of descriptors for an athlete

Emotion categories	Performance Situations		
	pre/mid	mid/post	pre/post
P+	0	0	0
N+	.24	.29	.2
P-	.2	.22	0
N-	.54	0	.24
P+N+	.12	.13	.11
P-N-	.40	.09	.15
P+N+P-N-	.48	.16	.18

Note. A+ descriptors included in the category of N+ and A- included in N-

TABLE 4 Descriptive data for anger intensity prior to, during and after best and worst performances

Performance situations	Study I				Study III			
	M	SD	Min	Max	M	SD	Min	Max
Best performance								
Prior to	20.1	6.1	15	36	3.8	3.7	0	10
During	22.7	9.7	15	52.5	4.0	4.0	0	11
After	17.3	3.9	15	28.7	1.1	2.7	0	10
Worst performance								
Prior to	25.3	11.7	15	55.5	3.4	4.0	0	11
During	25.5	8.6	15	46.7	6.0	3.6	0	11
After	27.6	11.7	15	53.5	7.8	2.8	0	11

Note. Scores in Study I range from 15 to 60, whereas scores in Study III range from 0 to 11.

Participants	Measures	Procedure
<p>STUDY I N=20 (14 male \6 female) 16 kumite \4 kata Mean age =24.9 ± 5.13 8 to 25 yrs. sport experience</p>	<p>STAXI-2 Performance rating from 0 to 10</p>	<p>Recall measures 2-3 situations pre-, mid-, post- best & worst performances</p>
<p>STUDY II N=16 (12 male \4 fem.) 15 kumite \1 kata Mean age =19.7 ± 3.93 6 to 22 yrs. sport experience</p> <p style="text-align: center;"> Follow-up ⇨ n=12</p>	<p>Metaphor-generation method Individualized emotion profiling Individualized anger profiling Modified CR-10 scale</p>	<p>Recall measures Best and worst performances Pre-, mid-, and post-event situations</p>
<p>STUDY III N=43 (28 male \15 female) 31 kumite \12 kata Mean age =19.3 ± 3.11 7 to 19 yrs. sport experience</p> <p style="text-align: center;"> n=1 Study I, n=12 Follow-up</p>	<p>Individualized anger profiling Individualized emotion profiling Modified CR-10 scale</p>	<p>Recall measures Best and worst performances Pre-, mid-, and post-event situations</p>
<p>STUDY IV N=63 (41 male \22 female) 43 kumite \20 kata Mean age =17.0 ± 2.68 5 to 19 yrs. sport experience</p> <p style="text-align: center;"> n=4 Follow-up n=18 Study III</p>	<p>Three kinds of open-ended questions:</p> <ul style="list-style-type: none"> • descriptive • structural • contrast 	<p>Questionnaires (n =29) Individual Interviews (n =34)</p>

FIGURE 1 Demographic information, assessment methods and procedure in sub-studies I to IV

Appendix 1 A metaphor profile generated by a karate athlete

Athlete	Gender	Age	Sport Experience	Sport event	Modality	Country	Best outcome
12	Male	18	12	Karate	Kumite	Spain	European champion

Best Performance				Worst Performance			
Final in the European Championship (in 2001). Everything was perfect. Every technique I used gave me a point. I won				Spanish Championship (in 1998). It was terrible, I was not strong or willing, and I was exhausted. I lost in the final.			

	Metaphor	Interpretative descriptors	Metaphor	Interpretative descriptors	
Before	Tiger	I felt <i>strong, determined, very willing</i> , I was convinced that I could win	Tired as a dog	I didn't want to move.	Before
During	Ray	I was very <i>fast</i>	Lead	I could not move.	During
After	First-time father	I was <i>happy</i> . I achieved what I wanted	River getting filled after a drought	I was <i>relieved</i> . After all the results were not that terrible	After

Appendix 2 A emotion profile (descriptors and intensity) generated by a karate athlete

Before	Performance situations		After		
	During				
Best Performance					
Positive (P+)					
active (activo)	10	dynamic (dinámico)	10	cheerful (alegre)	10
daring (atrevido)	10	balanced (equilibrado)	10	satisfied (satisfecho)	10
motivated (motivado)	10	resolute (firme)	9	overexcited (exaltado)	8
optimistic (optimista)	10	certain (seguro)	9	relaxed (relajado)	7
Negative (N+)					
fearful (temeroso)	4	anxious (ansioso)	7	anxious (ansioso)	4
restless (inquieto)	5			nervous (nervioso)	4
concerned (preocupado)	6			sluggish (perezoso)	6
tired (cansado)	5			tired (cansado)	9
Anger (A+)					
susceptible (susceptible)	9	susceptible (susceptible)	8		
resentful (resentido)	6	aggressive (agresivo)	3		
Worst Performance					
Positive (P-)					
dynamic (dinámico)	8	euphoric (eufórico)	9	resolute (firme)	6
energetic (enérgico)	9	unhurried (pausado)	4	free (libre)	5
glad (contento)	7	motivated (motivado)	8	unhurried (pausado)	4
willing (dispuesto)	9	alert (alerta)	5	relaxed (relajado)	3
agile (ágil)	7	dynamic (dinámico)	9		
Negative (N-)					
anguished (angustiado)	5	anguished (angustiado)	9	depressed (deprimido)	10
pessimistic (pesimista)	6	frightened (asustado)	9	discouraged (desanimado)	10
fearful (temeroso)	7	fearful (temeroso)	9	dissatisfied (insatisfecho)	10
confused (confundido)	9	worried (intranquilo)	10	pessimistic (pesimista)	10
worried (intranquilo)	9				
Anger (A-)					
displeased (disgustado)	6	furious (furioso)	9	grouchy (malhumorado)	5
annoyed (molesto)	6	annoyed (molesto)	9	mad (cabreado)	7
susceptible (susceptible)	7			displeased (disgustado)	8
angry (enfadado)	4			resentful (resentido)	9

Note. Intensity scores range from 0 (nothing at all) to 11 (maximal possible).