

Competing Under Pressure:

State Anxiety, Sports Performance and Assessment

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Cover illustration

Artist: Jack Raglin

Abstract

Elevated levels of anxiety are a common response to stressful competitive sports situations, are known to moderate athletic performance and are referred to as an unpleasant emotional state associated with perceptions of situational threat. The empirical studies in this dissertation considered primarily psychometric, methodological and conceptual issues of relevance for the study of anxiety and sports performance. In Study I, athletes were followed across a full competitive season to explore patterns of inter- and intra-individual variability of anxiety and self-confidence in relation to performance. The findings imply intra-individual anxiety and self-confidence variability to affect performance differently than the specific intensity level and are discussed in relation to more stable personality dispositions such as private self-consciousness. Study II evaluated the psychometric properties of the 27-item Competitive State Anxiety Inventory-2 (CSAI-2) and alternative versions of this scale. General support for a 17-item version (CSAI-2R) was found, but there are also psychometric limitations future research needs to resolve. Study III investigated assessment of intensity and directional ratings on single anxiety items with reference to the conceptualisation of anxiety symptoms as interpreted on a debilitating-facilitative continuum. The findings question the importance and rationale of assessing anxiety direction and revealed serious concerns with assessment procedures and statistical techniques applied in previous research. These concerns were also supported in Study IV, which explored athletes' idiosyncratic experiences of debilitating and facilitative anxiety symptoms in terms of intensity and emotional valence. The findings are discussed and summarised in a model in order to increase conceptual clarity and provide implications for future research regarding anxiety and related emotional performance states.

Keywords: competition, intra-individual variability, directional interpretations, emotions, sports performance, CSAI-2, psychometrics.

Doctoral dissertation, 2006
Department of Psychology, Stockholm University
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ISBN 91-7155-242-1
Printed in Sweden by US-AB, Stockholm 2006
Distributor: Stockholm University Library

Acknowledgements

I would like to start this section by expressing my sincere gratitude to my supervisor, Peter Hassmén, for providing me invaluable and generous guidance, support and lots of encouraging “Keep up the good work!” throughout my graduate education. Moreover, his “supervisor style”, by which he has challenged me to develop as a “non”-dependent researcher while simultaneously showing confidence and trust in my work, has been highly appreciated.

I also want to thank my assistant supervisor Göran Kenttä for great collaboration during these years, for his warm and friendly generosity, and for always taking time to discuss ideas when needed.

Further thanks to the rest of the Sport psychology group at the Swedish School of Sport and Health Sciences, Leif Strand and Johan Fallby, for a friendly and easy-going atmosphere and for stimulating discussions about research and teaching, as well as less serious subjects. Thanks also to Henrik Gustafsson, Mattias Johansson, Sören Hjälme and John Jouper, fellow graduate students at Örebro University, for enjoyable and interesting chats and discussions.

I would also like to gratefully acknowledge Ulf Lundberg and Peter Terry, who acted as formal examiners of my dissertation, for providing valuable and constructive comments. Thanks also to Nathalie Hassmén, who voluntarily reviewed my dissertation and contributed with additional feedback that inspired me to further improve my work.

My gratitude also goes to The Swedish School of Sport and Health Sciences (GIH), the Swedish National Centre for Research in Sports (CIF) and the Psychological Department, Stockholm University, for financial support of my research.

I would also like to thank Jack Raglin for great collaboration with Studies I and III, for sharing his expertise on anxiety research in sports and for creating an expressive picture to the cover of my dissertation.

All teachers at the Stockholm University should also be acknowledged for providing high quality courses in a diversity of interesting areas within psychology and, in addition, the fellow graduate students I have met during these courses for inspiring discussions and exchange of ideas.

Others I would like to thank are my colleagues at the Östermalms IP (ÖIP) at the Swedish School of Sport and Health Sciences, for contributing to an enjoyable work environment with lots of laughter during (and between) coffee breaks. Thanks also to colleagues at the Halmstad University, particularly Urban Johnson, for inspiring my interest in research during my undergraduate studies, Magnus Lindwall for constantly, yet in a friendly manner, challenging my self-esteem, and Hansi Hinic for his humoristic way of being.

I would further like to express my gratitude to all the athletes who volunteered to take part in the studies presented in this dissertation, and to their coaches who helped me with practical details during the implementation of the projects.

Many warm thanks go to my family, who is of great importance to me: My parents, Aina and Roland, and my sister Erika and her husband Håkan, for all your love and support. Furthermore, my nephews and nieces Julia, Lukas, Ludwig och Thea deserve special thanks for being rays of sunshine, who with their play and joy have helped distract my thoughts from work and have thereby contributed with necessary recovery. Thanks also to my mother- and father-in-law, Ingegärd and Lars, who have continuously encouraged me. Finally, I am deeply grateful to my love and best friend Henrik for your outstanding support and encouragement, for being just the person you are and for always believing in me. I admire your extensive patience during these years.

Finally, there are many more people in my social surroundings that in some way or another, either directly or indirectly, have been important to the progress of this dissertation. Mentioning all of them by name would unfortunately make this acknowledgement section overly extensive. I would therefore like to finish this section by expressing my sincere gratitude to all of you, not listed explicitly above, who have supplied me with inspiration, encouragement, support and energy during these years. Rest assured that your unique contributions have been invaluable to me.

List of studies

The present dissertation is based on the following studies, which are referred to in the text by their Roman numerals:

- I. Hassmén, P., Raglin, J.S., & Lundqvist, C. (2004). Intra-individual variability in state anxiety and self-confidence in elite golfers. *Journal of Sport Behavior*, 27, 277-290.

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- II. Lundqvist, C., & Hassmén, P. (2005). Competitive State Anxiety Inventory-2: Evaluating the Swedish version by confirmatory factor analyses. *Journal of Sports Sciences*, 23, 727-736.

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[<http://www.tandf.co.uk>]
- III. Lundqvist, C., Kenttä, G., & Raglin, J.S. (Submitted for publication). Absence of facilitative anxiety responses in elite young athletes.
- IV. Lundqvist, C., Kenttä, G., Durand-Bush, N., & Gustafsson, H. (Submitted for publication). On the distinction between debilitating and facilitative states of competitive anxiety: An idiographic approach.

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1. Introduction

“It’s as if a little devil is sitting on my shoulder and says to me that I am not going to manage this /.../ all the adrenaline turned into bad nervousness” (Study IV, p. 14).

The quotation above, expressed by a 17-year-old female athlete, illustrates the area of interest in this dissertation: the stress-related emotional response of performance anxiety among competitive athletes. Sport competitions are almost perfectly designed to evoke experiences of stress among participants. The competitive situation involves demands placed on athletes to perform their very best, often under intense pressure and specific conditions. The outcome of the event is generally of great importance and is highly valued by both the athlete and significant others, but is at the same time often perceived as highly uncertain because of the competitors’ almost identical skills. Hence, the nature of sports competition makes it a powerful stressor, which, consequently, can increase sudden intense emotional stress responses among athletes.

As evident in the description above, the term “stress” can be applied in a variety of ways (e.g., a stimulus variable, the organisms’ responses or effects related to an individual’s well-being) (McEwen, 2002). From a psychological perspective, stress is generally discussed in relation to an imbalance between the demands of the situation encountered by an individual and the perceived ability to cope or adjust to these demands (e.g., Lazarus, 1991). Thus, stress can have beneficial effects in terms of mobilisation of bodily resources to meet demands, but also detrimental effects when the perceived demands exceed the individual’s resources (McEwen, 2002). One of various stress responses is anxiety, referred to as an unpleasant emotion evoked when the individual appraises the stressful situation as threatening. Because elevated levels of anxiety have been observed to have the power to impede athletes from performing to their full capabilities (i.e., choking), researchers within sport psychology have tried to better the understanding of its influence on sports performance. This research field is founded on models of the stress process, but has focused predominantly on athletes’ responses in terms of anxiety (e.g., Burton, 1998). Constructs such as anxiety and arousal, but also affect, emotion and mood, are commonly used relatively interchangeably in research literature and everyday talk. These and other related

constructs are therefore discussed in the present dissertation in order to clarify some of the conceptual similarities and differences.

The subject of anxiety and sports performance could be considered a relatively narrow and straightforward topic, but more than 40 years of research suggests that the area is rather complex. While anxiety can result in significant performance decrements among athletes, some athletes also describe that they manage to perform very well, sometimes giving their best performances ever, when competing under intense anxiety-inducing pressure. Thus, responses of anxiety among athletes appear to be tied to individual differences (Raglin & Hanin, 2000). In order to provide explanations of the effect of anxiety on sports performances, a number of theoretical perspectives have been developed and explored. A majority of these theories and models have their origin in the study of anxiety within mainstream psychology, but have later been modified to suit the context of sports. With a starting point in the theoretical explanations suggested in today's research, the present dissertation aims to cast light on questions of effects of anxiety on sports performance, accounting for how both the debilitating and facilitative effects described in research and by athletes themselves can be explained. Additionally, because psychometric and methodological issues are closely interconnected with theoretical developments, the dissertation also aims to evaluate some of the assessment approaches commonly used in the research field.

2. A historical overview of anxiety research

2.1 The twentieth century: Anxiety research introduced within psychology

Anxiety is a well-studied construct in a range of psychological research areas, including sports, and has over the years undergone considerable refinements with regard to conceptualisation and inventories used. For a comprehensive understanding of the present body of knowledge of anxiety in sports, an appropriate starting point for this dissertation is to briefly overview the related historical developments within mainstream psychology. Whereas issues referring to anxiety were only occasionally mentioned in psychological literature during the first decades of the 20th century, albeit discussed by philosophers for centuries and included in theories by Freud, the number of published articles in psychological journals increased dramatically after 1950 (cf. Endler & Kocovski, 2001; Spielberger, 1966). The growing empirical interest could be explained, at least partly, by the development of inventories such as the Manifest Anxiety Scale (MAS; Taylor, 1953) and the Institute for Personality and Ability Testing (IPAT) Anxiety Scale (Cattell, 1957). Although these inventories were regarded as significant advancements to the study of anxiety, mainly because they provided researchers with new assessment possibilities, the early research still struggled with problems of ambiguities and vagueness in the conceptualisation of the construct. Specifically, anxiety was generally regarded as a global personality trait, expressed among individuals as stable differences in character. Explicit distinctions between stable anxiety tendencies and unstable anxiety reactions were, however, seldom provided in the studies conducted (Cattell, 1966; Spielberger, 1966). In addition, anxiety was frequently treated synonymously with constructs such as neuroticism, stress, depression, tension and fear, which further increased the conceptual confusion (Cattell, 1966).

Noticing the abundance of definitions used in the first phase of anxiety research, and highlighting the need to both define what anxiety is and to exclude what it is not, Cattell and colleagues (e.g., Cattell & Scheier, 1958) identified two distinct factors of anxiety through the use of factor and correlational analyses. The first factor was referred to as a trait because it included variables consisting of relatively stable personality characteristics.

The second factor was instead labelled as a state anxiety factor on the basis that it included variables with unitary response patterns that appeared to fluctuate over time (Cattell, 1966). Elaborating on this work, Spielberger (1966) took these findings a step further and formulated a conceptual framework of trait-state anxiety, in which the distinction between a stable and an unstable dimension of anxiety was highlighted (Spielberger, 1966). Herein, anxiety as a personality trait (A-trait) was regarded as an individual's average or normal level of anxiety, unrelated to the impact of situational variables, and was defined as: *"a motive or acquired behavioral disposition that predispose an individual to perceive a wide range of objectively nondangerous circumstances as threatening, and to respond to these with A-state reactions disproportionate in intensity to the magnitude of the objective danger"* (Spielberger, 1966, p. 17). Anxiety as a state (A-state) was instead defined as: *"subjective, consciously perceived feelings of apprehension and tension, accompanied by or associated with activation or arousal of the autonomic nervous system"* (Spielberger, 1966, p. 17).

Individual differences in A-trait were hypothesised as not necessarily displayed directly in behaviour, but instead determined whether the individual cognitively appraised specific stimuli as threatening and therefore was likely to respond with increased state anxiety. Some stimuli were proposed to evoke anxiety among most individuals regardless of individual trait anxiety levels (e.g., threat of objectively painful stimuli). Hence, the most important stimuli to investigate were suggested as those that produce distinct changes in state anxiety in individuals with various degrees of trait anxiety. In order to enable assessment of the new conceptualisation of anxiety, the 40-item inventory "State Trait Anxiety Inventory" was developed (STAI; Spielberger, Gorsuch, & Lushene, 1970), containing a trait scale (i.e., how one generally feels) and a state scale (i.e., how one feels at the moment). The scale later was revised and renamed as the STAI-form Y (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), and has played a significant role as a standard international measure of anxiety in psychological research (Spielberger & Diaz-Guerrero, 1983).

2.2 Anxiety research within sport psychology

The interest of anxiety experienced by athletes in relation to sport competitions increased dramatically in the beginning of the 1970's and continues to be an intensely studied topic. Yet, issues of "athletes losing their nerve" had indeed been mentioned much earlier in the psychological literature. For example, Griffith (1934) discussed observations of athletes that displayed good sport techniques at practice, but were poor "game performers" who failed completely when it came to competition. Although the word anxiety was not used explicitly, concepts such as "ball shyness", "crowd shyness"

and “fear responses” among athletes can be interpreted as early expressions of what we today label as sport performance anxiety or competitive anxiety. Moreover, Griffith (1934) noticed that *“the athletic field and the dressing room are veritable experimental laboratories for the study of emotion and mood”* and that *“the athletic field makes a more accessible laboratory for the practical study of various psychological traits than is made by almost any other situation into which human beings may venture”* (p. 23-24).

Considering the somewhat one-sided trait paradigm and general problems of conceptualising the anxiety construct displayed in mainstream psychology during the first phases of anxiety research, it is not surprising that similar problems were also evident in early anxiety research in the context of sports. Anxiety, as well as other personality factors, was often assessed to make comparisons of personality profiles of different groups of athletes. These studies were conducted in a search for useful methods to predict and select promising athletes, whereas intervention studies were rare. General trait measures were used, but with little consideration for the fact that they were sometimes developed to assess the personality factors of clinical samples (Vanden Auweele, De Cuyper, Van Mele, & Rzewnicki, 1993; Vealey, 1989). An increasing conviction among researchers was nevertheless evident for the usefulness of an interactionistic view, in which both personality factors and situational factors were accounted for (Vealey, 1989). Thus, in the light of inconsistencies displayed in the early research results, the trait-state distinction of anxiety suggested by Spielberger (1966) was welcomed with enthusiasm.

The increased research interest of the role of anxiety in sports competition was certainly shown in Europe. During the late 1970's and early 1980's, the European Federation of Sports Psychology (Federation Européenne de Psychologie des Sports et des Activités Corporelles; FEPSAC) initiated an international research project specifically dedicated to increasing the understanding of anxiety in sports (Schilling & Apitzsch, 1989). Because the STAI was relatively brief (40 items), and was therefore easy to apply in sports settings, it was judged suitable for sport psychology research and was soon adapted and regarded as a significant advancement in measurement (Schilling & Apitzsch, 1989; Smith, Smoll, & Wiechman, 1998). Studies utilising the STAI, which included a range of sports, generally supported that the state scale of the STAI was sensitive to changes in anxiety levels among athletes, but less support for the usefulness of the trait scale was found (Spielberger, 1989).

2.3 The anxiety response: General or situation-specific?

Soon after Spielberger (1966) introduced the distinction between trait and state anxiety, other researchers in fields of test anxiety and social evaluation anxiety proposed a further evolution of the construct. These researchers argued that trait anxiety should not be viewed or assessed as a general construct applicable to a range of situations, but should instead be treated as a learned response to specific situations (Sarason, 1980; Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960; Watson & Friend, 1969). Others have also contended that trait anxiety could be split into sub-dimensions, including at least dimensions of social evaluation, physical danger, ambiguous or novel situations and harmless situations in the individual's daily routines (Endler & Kocovski, 2001). Hence, based on their specific trait anxiety facets, individuals might differ in the situations in which state anxiety is perceived. Even though an individual might respond with anxiety when, for example, forced to speak or act in front of an audience, this should not necessarily mean that this would be the case in other situations such as competing in sports (cf. Burton, 1998). Support for this notion was found when situation-specific trait anxiety scales were developed. Results showed that these scales could predict individuals' behaviour more precisely than general scales had previously accomplished. Hence, the increased information about the situation and how individuals generally tend to respond in these situations were proposed to provide more valuable knowledge of anxiety than assessment of general trait anxiety (Sarason, 1980; Sarason et al., 1960; Watson & Friend, 1969).

Inspired by these findings, Martens (1971; Martens, Vealey, & Burton, 1990) set out to develop a sport-specific trait anxiety scale by generating and modifying items from existing general scales plus creating new items. This work resulted in an inventory called the Sport Competition Anxiety Test (SCAT). Soon, the need for a sport-specific state anxiety scale was also noted, and items from the state form of the STAI were modified in order to develop the Competitive State Anxiety Inventory (CSAI; Martens, Burton, Rivkin, & Simons, 1980). Both the SCAT and the CSAI were one-dimensional in nature and, as will be discussed in later sections of this dissertation, multidimensional scales have subsequently also been developed. This was nevertheless a starting point for a general trend in sport psychology in developing and adopting sport-specific scales in preference to general ones (Gauvin & Russell, 1993; Ostrow, 1996). Even though some researchers have continued to use general anxiety scales, predominantly the STAI, and contend that if properly used they do provide valuable information about athletic performance (e.g., Hanin, 2000a), the use of sport-specific scales has dominated sport anxiety research since their introduction.

3. Emotions, moods and coping

3.1 The distinction between emotion and mood

Anxiety as an emotional response to stressful situations has been mentioned previously in this dissertation, but athletes' experiences of being anxious are also sometimes referred to in the literature as a mood state. Whereas constructs such as affect, emotion and mood are closely related, on a theoretical level they refer to distinct constructs (Beedie, Terry, & Lane, 2005; Lane, Beedie, & Stevens, 2005; Mellalieu, 2003). Yet, as noted by Lane and Terry (2000), the constructs are seldom clearly conceptualised in studies or in the measurements used. This lack of clarity complicates interpretations of which construct was actually studied and, consequently, leads to an apparent risk of contradictory findings and interpretations in research (Lane & Terry, 2000). Some controversy exists about the exact nature of what differentiates the constructs, and various criteria are also used to describe the distinctions (cf. Ekman, 1994a). Affect is often adopted as a broad, undifferentiated term referring to, for example, unspecific stress responses, emotions, moods or the individual's subjective experience of these feeling states (Gross, 1999; Vallerand & Blanchard, 2000). Positive affect has been suggested to reflect an individual's feelings of being enthusiastic, active and alert, whereas negative affect has been described as a general feeling of distress, unpleasurable engagement including various aversive moods and emotions (Watson, Clark, & Tellegen, 1988).

Moods and emotions are instead generally more narrowly specified, and mood (e.g., an anxious mood) is often referred to as a relatively long-lasting, diffuse state not directly related to any specific objective. Furthermore, moods are proposed to predominantly impact the cognitions of the individual (e.g., memory and information processing) (Davidson, 1994; Lane & Terry, 2000; Siemer, 2005; Vallerand & Blanchard, 2000). Emotions, on the other hand, are often regarded as short-lived and more intense reactions tied to a specific event or object, evaluated as significant for the individual, that could be real but also subjectively appraised (Lane & Terry, 2000; Vallerand & Blanchard, 2000). Moreover, unlike moods, emotions are suggested to not only make individuals feel or think something but also to increase the urge to act or alter the behaviour. The latter could be illustrated by commonly used expressions such as "frozen by fear" or "moved to tears" (Davidson, 1994; Gross, 1999; Vallerand & Blanchard, 2000). From an applied viewpoint, the

different facets of emotions and moods also imply that separate strategies might be effective in order to regulate them optimally; for instance, coping with the source of an emotion but adopting cognitive oriented regulation strategies to alter a mood state (Beedie et al., 2005; Jones, 2003). Yet, a complicating matter is that moods and emotions also can be transactional: a mood state can make the individual more susceptible to certain types of emotions, but experiences of emotions can also evoke a mood (Ekman, 1994a; Lane & Terry, 2000).

3.2 Basic and discrete emotions

Whereas a general view is that emotions increase in situations judged to be important for the individual, different opinions are evident among researchers regarding the precise conceptualisation of emotions. A vast range of expressions for emotions exists in different languages; over 550 different emotions have been identified in the English language alone (Gross, 1999). Thus, a challenge researchers have struggled with is resolving how many emotions actually exist, but emotion researchers differ largely in the number of unique emotions proposed (see overview in Power & Dalgleish, 1997). One line of research also contends that some emotions are more fundamental and universal than others. These so-called basic emotions are explained to be a result of evolution and have evolved because of their adaptive functions vital to human survival and functioning (cf. Ekman, 1994b; Power & Dalgleish, 1997). Characteristics of basic emotions include, for example, automatic appraisal, unbidden occurrence, distinct antecedent events, quick onset but brief duration, distinctive physiology and presence in other primates (Ekman, 1994b). Moreover, antecedents and responses to these emotions should show cross-cultural similarities and be able to be linked biologically, for example to patterns in the autonomic nervous system (Ekman, 1994b; Gross, 1999).

Other emotional theorists (e.g., Frijda, 1988, 1994; Lazarus, 1991, 1999) view emotions as being linked to specific appraisals (primary and secondary appraisals) of the person-environment transaction and distinguish between discrete emotions. Primary appraisal is the individual's evaluation of whether the situation at hand is personally relevant to his or her well being, for instance the relevance and congruence/incongruence of the individual's goals or values and beliefs about the self and the world. Secondary appraisals instead constitute the individual's evaluation of coping ability and expectancies of whether the situation will change for the better or worse in the future (Lazarus, 1991, 1999). Individuals will accordingly be likely to differ in their appraisals and emotional reactions when confronting similar situations, but each discrete emotion is nevertheless proposed as being related to specific appraisals that together constitute the emotion's

qualitative content or “core relational theme”. Anxiety should, for instance, be constituted of the core relational theme of facing an uncertain, existential threat (Lazarus, 1991). All scholars do not agree with the classification of emotions into basic or discrete categories (e.g., Russell, 2003). Emotional experiences have instead been suggested as being more accurately explained by broader frameworks, for example activation and pleasure, while concurrently also accounting for processes such as perceptions, attributions and appraisals (Russell, 2003).

3.3. The role of coping for the emotional outcome of stressful situations

When individuals encounter stressful situations, the outcome in terms of positive (e.g., excitement) or negative (e.g., anxiety) emotional responses, and their subsequent effect on performance, will be influenced by the individuals’ ability to successfully manage the different external or internal demands perceived (Lazarus, 1999). Responses of anxiety have been associated with, for instance, situations in which the individual perceives a lack of ability to cope with the stress encountered (Woodman & Hardy, 2001). Thus, individuals will likely try to actively utilise different coping strategies in order to alter the appraisals, situation or emotional response (Lazarus, 1991). Because coping strategies utilised generally involve a large variety of actions, behaviours and cognitions, a number of different higher-order categorisations of coping have been proposed in the literature (Skinner, Edge, Altman, & Sherwood, 2003). Even though some of these classifications focus on the outcome of coping (e.g., the individual either approaches or avoids the situation), strategies utilised by the individual are not always successful or do not necessarily match the stressor adequately. Many researchers therefore agree that coping strategies should be distinguished from outcome to evaluate their effectiveness (e.g., Anshel, Kim, Kim, Chang, & Eom, 2001; Lazarus, 1999; Skinner et al., 2003).

The most commonly applied higher-order classification in sport psychology distinguishes between coping strategies that intend to directly address a situation that induces the stressful experience (i.e., problem-focused coping, sometimes also called task-oriented) and strategies that intend to regulate the emotional response or to cognitively reappraise the situation (i.e., emotion-focused coping) (Lazarus, 1999; Richards, 2004). This broad classification is based on a process-oriented perspective of coping in which coping is viewed as an inherent, simultaneous part in the transaction between environment and person and is defined as: “*constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person*” (Lazarus &

Folkman, 1984, p. 141). Importantly, problem-focused and emotion-focused coping have often mistakenly been treated as two distinct phenomena: The first being suggested as more preferable when stressors are controllable and the second when the individual perceives the stressors as more uncontrollable in nature (Anshel et al., 2001; Lazarus, 1999; Puente-Díaz & Anshel, 2005). Moreover, problem-focused coping has, at least in cultures where control over one's environment is viewed as advantageous, often been regarded as more preferable in a majority of situations. The original definition did not value one more than the other, and each coping strategy is also likely to serve multiple purposes, which implies that they in reality can seldom be clearly separated. Thus, they will likely work in a supportive manner, and their effectiveness is a consequence of how the coping strategies fit the perceived environmental demands to be coped with (Lazarus, 1999, 2000b; Richards, 2004; Skinner et al., 2003). Whereas the problem and emotion-focused classification of coping has been frequently applied in sport psychology research, narrower classifications have also been proposed. Anshel and colleagues (2001) argue, for instance, in favour of a four-dimensional classification: approach-behavioural coping (i.e., actions to resolve the stressful situation), approach-cognitive coping (i.e., thoughts to regulate emotions and reduce the stress), avoidance-behavioural coping (i.e., actions to physically distance oneself from the source of stress), and avoidance-cognitive coping (i.e., psychological attempts to distance oneself or reappraise the situation).

Even though the view of coping as a process is the most widespread approach within sport psychology research (Richards, 2004), other researchers contend that individuals possess different coping styles that predispose them to use a preferred set of coping strategies across a variety of situations or, alternatively, over time but in similar situations (Anshel & Weinberg, 1999; Anshel, Williams, & Williams, 2000; Wang, Marchant, & Morris, 2004). Overall, there is a lack of support for the notion that athletes do cope in a similar manner with different situations, and the approach has also been criticised as being atheoretical (Crocker, Kowalski, & Graham, 1998; Lazarus, 1999). Instead, coping style is suggested to be characteristic of the typical coping strategies used with regard to each of several specific stressors appraised as personally relevant (Anshel et al., 2000). Moreover, a diversity of personality dispositions has been found as related to the adoption of stable patterns of coping strategies among individuals (Richards, 2004). For instance, Giacobbi and Weinberg (2000) found a relationship between high trait anxiety and the use of coping strategies such as behavioural disengagement, self-blame, humour, denial and wishful thinking. Dispositional optimism and trait sport confidence have instead been identified as being related with the use of problem-focused strategies (Grove & Heard, 1997). Thus, many researchers agree that a separation of coping efforts from the individual's personality would be superficial. As Lazarus (1999)

suggests, to fully understand an individual's choice of a certain coping strategy, one needs to understand the individual's personal meaning and appraisal of the situation, which will in turn be dependent on his or her personality. Individuals are also likely to differ in their ability to cope in a flexible manner across situations as a result of individual differences in cognitive processes such as the ability for complex thinking (cf. Cheng & Cheung, 2005).

4. The nature of competitive anxiety in sports

4.1 Arousal and anxiety – what are we referring to?

Even if athletes respond differently to competitive situations perceived as stressful, increased levels of anxiety are a fairly common emotional response that could lead to detrimental effects on performance. Thus, the study of the anxiety response in competitive situations has received much attention within sport psychology literature. Within this field of research, the constructs of arousal and state anxiety have often been used relatively synonymously. Although these constructs are often highly related, they should be distinguished conceptually because of the different implications they have for both theory and assessment (Arent & Landers, 2003; Krane, 1992; Woodman & Hardy, 2001). Because of a lack of clarity within research conducted about which of the two terms (anxiety versus arousal) were actually studied, early conclusions in anxiety research have been criticised as being somewhat unclear (Krane, 1992). Even though the primary focus of this dissertation is on the state anxiety construct, it seems appropriate to also briefly describe both of these constructs in order to clarify the terms and provide operational definitions.

4.2 Arousal

In the literature, arousal has often been described with a number of labels such as activation, “psyched up”, mental readiness, energy mobilisation and excitation (Zaichkowsky & Takenaka, 1993). Moreover, arousal is commonly discussed within the construct of motivation, involving an energising function that physiologically places the individual in a state of readiness and directs the behaviour and mind to the goal or task at hand (Lavallee, Kremer, Moran, & Williams, 2004). Whereas arousal has generally been treated as one-dimensional in nature, it has also been argued that not only physiological, but also behavioural and cognitive, components are involved (Weinberg, 1989). In line with this notion, Gould and Krane (1992) defined arousal as a *“general physiological and psychological activation of the organism that varies on a continuum from deep sleep to intense excitement”* (p. 121). Other definitions with a more direct focus on physiological responses, for example *“the organism’s phasic physiological response to environmental stimuli”* (Hardy, Parfitt, & Pates, 1994, p. 328) have also been applied in sport psy-

chology research. Theoretical explanations of the impact of arousal on sports performance suggest that arousal might display either a direct or indirect effect. The direct impact occurs as a consequence of arousal, altering the athlete's access to cognitive and physiological resources, whereas the indirect effect influences performance by the athlete's interpretation of physiological symptoms as either positive or negative (Hardy, 1996; Hardy et al., 1994). It should be noted that arousal could affect performance either positively or negatively, depending on the intensity level and the nature of the skill or task. Thus, fine-motor skills (e.g., golf putting) requiring control of unwanted muscle activity and precision, or tasks that require a high degree of concentration or decision-making (e.g., open skilled), will tolerate merely low levels of arousal before performance is negatively affected. In contrast, gross motor skills (e.g., weight lifting) or tasks with lower decision demands (e.g., closed skilled) will benefit from increased arousal levels and, thus, will tolerate higher levels of arousal before performance is impaired (Landers & Arent, 2001).

The construct of arousal has also been criticised. Neiss (1988), for example, argued that the concept is too broad and simplistic to be useful in psychological research, but that the seeming simplicity of the construct appeals to researchers' engagement more than the study of more complex constructs such as different states of emotions. Neiss (1988) argued further that although physiological arousal (or activity) is often present in different emotional states such as anxiety or anger, it only constitutes one component of these states. Hence, arousal should accordingly be viewed as being interrelated with other cognitive and affective constructs, which implies that similar indicators of heightened physiological arousal might be present in diverse psychological states.

4.3 Competitive state anxiety

Early sport psychology researchers were predominantly interested in the arousal construct, but more recent research has frequently focused on state anxiety in preference to arousal. State anxiety is generally regarded as an unpleasant emotional reaction related to stressful situations, in which the arousal component is one inherent element (Woodman & Hardy, 2001). An important distinction between arousal and anxiety is that anxiety involves interpretation of the situation as threatening, whereas arousal is unrelated to any such interpretations (Hammermeister & Burton, 2001). Moreover, anxiety has been suggested as a better predictor of the performance outcome than arousal when the tasks are of a more complex nature and contain a higher cognitive load (Arent & Landers, 2003).

The current most dominant view of state anxiety is to treat it as a multidimensional construct that, apart from the trait-state distinction, also is separated into a cognitive and somatic sub-dimension (Jones, 1995; Martens, Burton, Vealey, Bump, & Smith, 1990; Woodman & Hardy, 2001). This perspective was adopted from anxiety research in educational and clinical psychology, whereby the two research disciplines independently found evidence for the distinction of state anxiety as a cognitive (worry) and somatic (emotionality) component (Davidson & Schwartz, 1976; Liebert & Morris, 1967). Based on test-anxiety research in educational psychology, the cognitive element of anxiety was labelled as “worry” and was defined as individuals’ cognitive concerns and negative self-expectations, worry about the situation and possible consequences. The somatic component was instead referred to as “emotionality” and defined as the individuals’ perceptions of physiological and affective elements of anxiety, including indications of autonomic arousal and unpleasant symptoms such as tension and nervousness (Liebert & Morris, 1967; Morris, Davis, & Hutchings, 1981). In the clinical literature, a distinction was instead made between “cognitive anxiety” (i.e., conscious awareness of unpleasant feelings about oneself or external stimuli, worry and disturbing visual images), “somatic anxiety” (awareness of, for instance, blushing, increased heart rate and muscular symptoms), and “attentional disturbances” (Davidson & Schwartz, 1976). Even though test anxiety research and clinical research each labelled the cognitive-somatic distinction a bit differently, the cores of the sub-dimensions were rather similar. The constructs of cognitive anxiety/worry and somatic anxiety/emotionality were further proposed to display covariation in stressful situations and were therefore not viewed as totally independent constructs (Morris et al., 1981).

In sport psychology literature, these findings were first adopted by Martens and colleagues (1990a). Sport-related cognitive anxiety (cognitive A-state) was described as being closely related with worry, and included negative expectations about performance and negative self-evaluation. Somatic state anxiety (somatic A-state) was instead referred to as the individual’s experience of physiological and affective parts of the anxiety response, stemming directly from autonomic arousal. Hence, perceived responses such as rapid heart rate, tense muscles, shortness of breath and “butterflies in the stomach” were suggested to reflect indicators of increased somatic state anxiety among athletes. Yet, these symptoms were viewed to only affect performance if they preoccupied the athletes’ thoughts (Martens et al., 1990a). Martens also encouraged the search for more specific sub-dimensions of cognitive anxiety and some researchers have later suggested that worry could be divided into, for example, worry about injuries, physical danger and outcome uncertainty (Dunn, 1999; Dunn & Syrotuik, 2003). Others have instead criticised the differentiation of cognitive and somatic anxiety as an outdated dualistic view of the human by which mind and body are separated (Landers, 1994;

Landers & Arent, 2001). Nevertheless, particularly the separation of cognitive and somatic anxiety has been adopted frequently in sport anxiety research. While their interplay has received acknowledgement, a general view is that treating cognitive and somatic anxiety separately is valuable for the understanding of the different effects they might display on sports performance (Gould, Greenleaf, & Krane, 2002).

Cognitive anxiety, in particular, is suggested as being associated with antecedents of threats against the self (e.g., self-presentation threats), whereas somatic anxiety is suggested as linked to antecedents (e.g., environmental stimuli) that elicit increases in autonomic arousal (cf. Burton, 1998; Wilson & Eklund, 1998; Woodman & Hardy, 2001). For example, athletes generally respond with increased state anxiety in situations in which competition is viewed as important for the athlete and the outcome is perceived as highly uncertain (Martens et al., 1990a; Raglin & Hanin, 2000). A premier antecedent to state anxiety in these situations is the perception of threat (e.g., worry of failure or of negative social evaluation) (Hammermeister & Burton, 2001). Building on work by Lazarus and colleagues (Lazarus, 1999; Lazarus & Folkman, 1984) and applying it more specifically onto sports situations, Cerin, Szabo, Hunt, and Williams (2000) further underline the complexity involved. They suggest that the interplay between variables such as (a) demands, constraints and opportunities within the competitive situation, (b) temporal and stable situational and personal factors (e.g., age, gender, experience, a variety of personality dispositions, the nature of the sport), and finally (c) the athlete's appraisal of the situation and coping behaviours, are all important variables to consider in order to understand the athlete's emotional responses and subsequent behaviour (Cerin et al., 2000).

4.4 Assessment approaches of anxiety within sports

Because anxiety involves an arousal component and is related to activation of the sympathetic nervous system, one possible approach to assess anxiety is the use of psychophysiological indicators. These indicators can be classified into three main types: respiratory/cardiovascular (e.g., heart rate, blood pressure and respiration rate), biochemical (e.g., levels of adrenaline, noradrenalin and cortisol), and electrophysical (e.g., muscle activity or galvanic skin response) (Burton, 1998; Hackfort & Schwenkmezger, 1993). One advantage of the use of psychophysiological indicators, compared with self-report instruments of anxiety, is that these indicators can be used without having to rely on the individual's ability of self-observation or an ability to express experiences verbally. Hence, problems with repression of anxiety symptoms, social desirability, and a variety of response sets frequently encountered when self-report scales are used can be avoided.

Moreover, these indicators can often be assessed continuously and without interrupting the individual's natural behaviour (Hackfort & Schwenkmezger, 1993). Despite these and other advantages, a variety of disadvantages have resulted in self-report scales becoming the most common assessment approach applied when anxiety is studied within sports. A primary explanation is that, although physical indicators are direct measures of physiological processes within the individual, they are indirect measures of anxiety or other related emotional states. Basically, no generally accepted physiological index is present today in which specific physiological patterns of different emotions, such as anxiety, have been specified (Burton, 1998; Cerin et al., 2000). Hence, even if two athletes demonstrate approximately similar patterns of psychophysiological indices, they can still interpret the physiological arousal or the stressful situation differently and therefore experience qualitatively different emotional states (e.g., anxiety versus excitement or being "psyched up"). Because the individual's cognitive evaluation of both psychological and physiological stimuli is accepted to be heavily involved when anxiety is evoked, pure reliance on physiological indicators of anxiety has generally been regarded as somewhat problematic (Eysenck, 1992; Hackfort & Schwenkmezger, 1993; Lavalley et al., 2004).

Another troublesome issue is that coaches and athletes often hesitate to participate in studies in which repeated assessments of physiological factors are needed immediately or during performances (Ward & Cox, 2004). Moreover, most athletic tasks also involve physical activity, and because movements can increase changes in physiological indicators more than the emotional response itself, these indicators appear most reliable (and practical) for use in sports that are relatively stationary in nature (e.g., shooting or golf putting). As a consequence, a number of anxiety inventories have been specifically developed to account for sport-related state anxiety (cf. Ostrow, 1996), of which the Competitive State Anxiety Inventory-2 (Martens et al., 1990a), and short versions of the CSAI-2, such as the Mental Readiness Scale (Krane, 1994) and the Anxiety Rating Scale (ARS; Cox, Russell, & Robb, 1998), have been used most frequently. Noteworthy is that even though arousal is generally assessed using physiological indices, such as heart rate, some researchers contend that self-inventories (e.g., the Sport Grid-Revised; Ward & Cox, 2004) could also be used to reliably assess physiological arousal, or more correctly, to assess "felt arousal". In line with this notion, felt arousal is distinguished from somatic anxiety and is defined as *"how aroused or activated a person felt, independent of whether the feeling associated with arousal was positive or negative"* (Raedeke & Stein, 1994, p. 364). However, support for the reliability of felt arousal as an estimation of physiological arousal has, to date, been mixed (cf. Raglin, 1992; Ward & Cox, 2004).

5. Anxiety and athletic performance: The “how” question

The relationship between anxiety and performance has attracted much research. The origins of this work can be found in the early study of arousal and performance, in which anxiety generally was regarded to be present when arousal states were high (Weinberg, 1989). Although theories such as Drive theory (Hull, 1943; Spence & Spence, 1966), the inverted-U hypothesis (Yerkes & Dodson, 1908) and Reversal theory (Kerr, 1997) all have contributed to the understanding and development of the field, their original focus was aimed at the relationship between arousal and performance – and consequently not at anxiety and performance. Acknowledging that the above-mentioned theories are often cited in sport anxiety research, only an overview of the theoretical perspectives proposed to specifically predict anxiety and performance will be provided.

5.1 Multidimensional Anxiety Theory of performance assessed by the CSAI-2

Encouraged by results presented in research on test and clinical anxiety (Davidson & Schwartz, 1976; Liebert & Morris, 1967), which proposed a division of the anxiety construct into a cognitive (worry) and somatic (emotionality) component, Martens et al. (1990a) suggested the Multidimensional Anxiety Theory to predict sport performance. Specifically, cognitive anxiety was hypothesised to be negatively and linearly related to performance and to vary throughout the competition. This perspective was based on theories derived from research on attention (Wine, 1971), leading Martens and colleagues (1990a) to propose that cognitive anxiety would cause athletes to become preoccupied with thoughts about possible failure and negative self-evaluation. Limited attention should therefore be left for the task the athletes were confronted with and, hence, cognitive anxiety was hypothesised to have powerful negative effects on most forms of performance.

Somatic anxiety, on the other hand, was suggested as being related to performance in a form of an inverted U, and particularly harmful for fine motor skills. According to this notion, which was built on the increasingly abandoned inverted-U hypothesis (Yerkes & Dodson, 1908), it was predicted that

when somatic anxiety increases so does performance, but only up to an optimal level. Further increases of somatic anxiety above the optimal level should instead gradually impair performance. Although Martens and associates discussed the predicted relationship as a consequence of physical reactions such as tense muscles, rapid heart rate and butterflies in the stomach, these symptoms are generally regarded as physiological indicators of arousal. The theoretical rationale for why somatic anxiety, which is conceptually different from physiological arousal, should be likely to follow a curvilinear relationship to performance was not clearly stated (Woodman & Hardy, 2001, 2003). Nevertheless, unless athletes became preoccupied with thoughts of the physiological symptoms experienced, somatic anxiety was predicted to have less impact on performance than cognitive anxiety. Somatic anxiety was also suggested to increase until the start of the event and thereafter decrease significantly, which would minimise its detrimental effect on performance (Martens et al., 1990a).

In order to test the predicted relationships of the model, Martens and colleagues (introduced in 1982 but published in book format in 1990) redeveloped the one-dimensional CSAI (Martens et al., 1980) to also include subscales of cognitive and somatic anxiety, fear of physical harm and generalised anxiety. Yet, during the process of validation, only the factors of cognitive and somatic anxiety could be supported, leading the authors to exclude the other sub-dimensions from the questionnaire. Furthermore, initial exploratory factor analyses unexpectedly suggested that the cognitive factor could be split into two sub-components. Because cognitive items that were positively worded and negatively worded loaded onto separate factors, the factor with positive wording was decided to represent self-confidence instead of cognitive anxiety. Moreover, as self-confidence appeared to represent the opposite of cognitive anxiety, they were hypothesised as constituting opposite ends of a single continuum. Consequently, Martens and colleagues (1990a) predicted that self-confidence would be linearly and positively related to performance. Relatively late in the process of scale development, a social desirability problem was also detected in the new scale. This led the developers to use the word “concerned” in preference to “worried” in all cognitive items in which it was used. In addition, recommendations to use social desirability instructions were included. Since publication of the CSAI-2 in 1990, the scale has been used extensively within sport anxiety research (Craft, Magyar, Becker, & Feltz, 2003; Woodman & Hardy, 2003). It should be noted that critique has also been raised about choices made during scale development, especially the decision to change the word “worry” to “concern” (Burton, 1998; Burton & Naylor, 1997; Lane, Sewell, Terry, Bartram, & Nesti, 1999). This will be discussed more thoroughly in Section 7: *Conceptual and methodological issues*.

Research using the CSAI-2 to test the predictions of the Multidimensional Anxiety Theory has been contradictory, and reviews (Gould et al., 2002; Landers & Arent, 2001) reveal that only a few studies have supported the predicted relationships. Other studies have only found support for some of the predictions (cognitive anxiety, somatic anxiety or self-confidence), or failed to provide any support for the hypothesised relationships. Noteworthy is also that two independent meta-analyses, which both tested the predictions of cognitive anxiety and self-confidence (Craft et al., 2003; Woodman & Hardy, 2003), arrived at somewhat different conclusions. Craft and colleagues (2003) included 29 studies conducted until October 1999, based on the criterion that the studies used the CSAI-2 to investigate the relationship between state anxiety and performance. Overall, their results did not support a negative linear relationship between cognitive anxiety and performance. The findings only provided moderate support, with a relatively weak correlation and low effect size, for the predicted positive linear relationship between self-confidence and performance (Craft et al., 2003). In the second meta-analysis, performed by Woodman and Hardy (2003), a total of 48 studies conducted until 2001 were included. The studies were selected based on the criteria that state cognitive anxiety and self-confidence had been assessed before a competition, and that sport performance was assessed in a field setting. Although the use of CSAI-2 was not a criterion, a majority of the studies included had still assessed state anxiety by this inventory. In contrast to the findings by Craft et al. (2003), the predicted relationship of cognitive and self-confidence was both supported. Self-confidence was nevertheless displayed as being more strongly related to performance than cognitive anxiety (Woodman & Hardy, 2003). Even though the validity of the Multidimensional Anxiety Theory has been questioned, researchers have continued to utilise the CSAI-2 in order to test other theoretical perspectives (Craft et al., 2003).

5.2 Accounting for athletes' interpretation of anxiety: The directional dimension

Relatively early, it was acknowledged that athletes might interpret single physiological states differently, which can also result in differences in how performance is affected (e.g., Apter, 1984). Although this view was based on research on arousal, with support from findings in the test anxiety literature, it was transferred into anxiety research and was proposed as an alternative explanation for the contradictory results found in research on the anxiety-performance relationship (Jones, 1991, 1995). More specifically, researchers contended that athletes could perceive anxiety symptoms as either debilitating or facilitative to their sports performance (i.e., direction: Jones, 1991, 1995; Jones & Swain, 1992). As Swain and Jones (1996) hypothesised about

the anxiety response: *“Different individuals can report identical levels in terms of the intensity of the response, but because of variations in preferred levels, they may differ considerably in their interpretation of the debilitating-facilitative consequences for performance of that response”* (p. 4). This line of research was stimulated by doubts about the conceptualisation of anxiety in the CSAI-2; of primary concern was that the scale only assessed anxiety intensity but neglected athletes’ interpretations of the symptoms (Jones, 1991, 1995).

Based on some initial support for the directional dimension of anxiety (Jones, Hanton, & Swain, 1994; Jones & Swain, 1992; Jones, Swain, & Hardy, 1993), Jones (1995) modified the control-process model proposed by Carver and Scheier (1988) to provide a theoretical explanation to the findings. Herein, it was hypothesised that athletes’ confidence and perceived control would be important variables related to direction interpretation of symptoms associated with anxiety. That is, athletes with positive expectancies of their ability to cope and of their goal attainment were proposed to experience anxiety symptoms as facilitative, whereas athletes lacking such expectancies were suggested to perceive similar symptoms as debilitating.

Some discrepancies between the model proposed by Jones (1995) and the original model suggested by Carver and Scheier (1988) are worth highlighting. Although Carver and Scheier acknowledged that anxiety does not necessarily impair performance, they discussed the phenomenon in relation to self-regulation via feedback control of anxiety. That is, anxiety was seen as a conflict between different important reference values, and individuals were suggested to make adjustments using self-regulation to decrease the gap between actual and desired actions. Hence, unlike Jones (1995), the original model provides a feedback loop by which confidence and expectations of a positive outcome are suggested to make individuals respond to anxiety with renewed effort to reduce the discrepancy between conflicting reference values. Importantly, if these attempts are successful, the model predicts that anxiety will not rise. In contrast, those individuals who doubt their ability to cope or perform successfully are instead suggested to disengage from any attempts of discrepancy reduction. A further difference between Jones’ (1995) model and previous proposed theoretical models was discussed by Burton and Naylor (1997), who noted similarities with the work presented by Lazarus’ (1991) concerning emotions. Yet, Lazarus suggested that positive expectations of coping and goal attainment should increase responses of positive emotions, whereas negative expectancies should increase negative emotions, such as anxiety. Hence, the theoretical explanation provided by Jones (1995) differs slightly, but importantly, with regard to explanations provided by other models in related research areas.

In order to assess both anxiety intensity and direction simultaneously, the most common approach is to include a seven-point bipolar direction scale (-3="Very debilitating to performance" to +3="Very facilitative to performance") after each item in the CSAI-2 (e.g., Hanton, Jones, & Mullen, 2000; Jones & Swain, 1992; Mellalieu, Hanton, O'Brien, 2004). In practical terms, this means that the athletes first rate how much (i.e., intensity) of each anxiety symptom he or she experiences, and secondly how the experienced anxiety symptom is perceived to affect the performance (i.e., direction). The intensity and direction scores are thereafter summarised separately in order to obtain a total score of anxiety intensity and anxiety direction, respectively.

Using this approach, a growing body of findings supports the notion that both intensity and direction of anxiety are valuable to assess. For example, samples of skilled, experienced or competitive-oriented athletes have displayed more facilitative mean direction scores compared with their counterparts, despite a lack of differences in mean intensity scores (Jones & Swain, 1995; Jones et al., 1993, 1994; Mellalieu et al., 2004; Perry & Williams, 1998). Findings like these have encouraged some researchers to conclude that the direction dimension is a more sensitive indicator of sport-related anxiety symptoms that predicts performance better than intensity, at least when group comparisons are considered (Jones & Hanton, 2001; Mellalieu, Hanton, & Jones, 2003). Studies have also indicated that athletes who score a high positive mean value on the direction scale label their pre-competitive experience with more positively toned feeling descriptors compared to "debilitators" (Jones & Hanton, 2001; Mellalieu et al., 2003). Moreover, athletes classified as "debilitators" have shown a processing bias toward threatening information whereas "facilitators" instead show a bias toward positive interpretation of stimuli (Eubank, Collins, & Smith, 2000, 2002). As studies have found "facilitators" to report higher levels of self-confidence than "debilitators" (Jones et al., 1993, 1994; Jones & Swain, 1995), self-confidence has been suggested to act as a buffer that protects athletes from interpreting elevated symptoms of anxiety as debilitating (Hanton & Jones, 2001). Qualitative studies have also arrived at the same conclusion, and have suggested self-confidence and perceived control as factors likely to moderate athletes' debilitating or facilitative interpretations of anxiety symptoms (Hanton & Connaughton, 2002; Hanton, Mellalieu, & Young, 2002).

Despite considerable research supporting the directional dimension of anxiety symptoms, critical voices have argued that the findings merely express shortcomings in the anxiety inventories used. Lack of construct validity, because of too-neutral wording, could allow athletes to interpret statements differently, making it unclear as to what facilitative ratings of anxiety symptoms actually represent (Burton, 1998; Burton & Naylor, 1997). The critique of the directional perspective will be more thoroughly discussed in Section 7: *Conceptual and methodological issues*.

5.3 Interactions between anxiety components: The Cusp catastrophe model

Other theoretical perspectives, apart from the notion of anxiety direction (Jones, 1991, 1995), have also stressed that cognitive anxiety might not always be perceived as negative for performance but provided alternative explanations. The implementation of catastrophe models in sport psychology research grew predominantly out of dissatisfaction with previous theories, especially that the Multidimensional Anxiety Theory predicted separate relationships of cognitive and somatic anxiety with performance. Yet, the interplay between the anxiety dimensions was not accounted for (Hardy, 1990; Hardy & Parfitt, 1991). The catastrophe model was originally a mathematical theory developed specifically for “*modeling discontinuities in mathematical functions that were normally continuous*” (Hardy, 1996, p. 142), and which allowed testing of a three-dimensional relationship between variables. Hence, Hardy and colleagues (Fazey & Hardy, 1988; Hardy, 1990) applied it as a possible model in sports anxiety research. It predicted that when an athlete experiences a low level of cognitive anxiety, any physiological changes lead to small and continuous changes in performance in the form of an inverted U. On the other hand, if cognitive anxiety is high, an increase of physiological arousal to an intermediate level should lead to a large and sudden drop in performance, which was labelled as hysteresis. Hysteresis should accordingly only occur if cognitive anxiety is high, and when it happens, athletes should need to considerably decrease both cognitive anxiety and physiological arousal levels in order to reach at least a moderately good performance level again (Hardy, 1990, 1996, 1999). Hence, cognitive anxiety could, according to the model, influence performance positively or negatively, depending on the physiological arousal level experienced.

Hardy and colleagues chose deliberately to include physiological arousal instead of somatic anxiety in the model, which in practical terms means that the participants’ heart rates generally have been assessed as an indicator of physiological arousal (Cohen, Pargman, & Tenenbaum, 2003; Hardy, 1996; Hardy et al., 1994). The primary cause for this choice was that somatic anxiety was argued to be limited to indicate only indirect effects of anxiety, and should be displayed only if athletes become preoccupied with the experience of the symptoms. Physiological arousal was instead argued to directly reflect biochemical changes within the individual and to affect performance either directly, by changing the athlete’s cognitive and physiological resources, or indirectly, depending on the athlete’s positive or negative interpretations of arousal (Hardy, 1990, 1996; Hardy et al., 1994; Parfitt, Hardy, & Pates, 1995). Other researchers (Cohen et al., 2003; Tenenbaum & Becker, 2005) have questioned this choice and have argued that the model should benefit from also including somatic anxiety because it might impact

performance in a different fashion. As noted by Tenenbaum and Becker (2005), somatic anxiety was actually assessed instead of physiological arousal by Hardy and colleagues themselves in some recent work (Hardy, Woodman, & Carrington, 2004). This choice has later been held as justified by Woodman and Hardy (2005), claiming that somatic anxiety was used as an approximation of the physiological arousal. Hence, the actual differences or similarities between somatic anxiety and physiological arousal, and which construct should preferably be used, still evokes discussion.

A primary criticism against the cusp catastrophe model is nevertheless based on its complexity and the statistical difficulties involved in testing the full model empirically (Gill, 1994; Krane, 1992). Consequently, only a few published studies have attempted to evaluate the model, and these were conducted primarily by Hardy and associates. The predicted interactions between cognitive anxiety, physiological arousal and performance have received some support (Edwards & Hardy, 1996; Hardy, 1996; Hardy & Parfitt, 1991; Hardy et al., 1994). Whereas Hardy and colleagues (Hardy & Parfitt, 1991; Hardy et al., 1994) also found some support for the notion of hysteresis, a recent study (Cohen et al., 2003), on the contrary, could not identify any large performance decrement among the participants studied.

An even more complex butterfly catastrophe model has been proposed, in which task difficulty and self-confidence also are included (Hardy, 1990). In this extended model, self-confidence is suggested to moderate the interaction between cognitive anxiety and physiological arousal. Thus, highly confident performers are predicted as being more likely to tolerate increased levels of physiological arousal when cognitive anxiety simultaneously is high. Although some support has been presented for this last prediction (Hardy, 1996; Hardy et al., 2004), the few studies that have attempted to test the complex predictions have thus far been questioned based on statistical concerns about the analyses conducted (Hardy, 1996; Tenenbaum & Becker, 2005).

5.4 Anxiety and “emotional” states: Individual Zones of Optimal Functioning

Although the perspective of Individual Zones of Optimal Functioning (IZOF) presented by Hanin (2000a,b, 2003) presently does not focus specifically on competitive-related anxiety, but instead concentrates on a range of psychobiosocial states together labelled as emotions, the original work was developed to cast light on the anxiety phenomenon. Applying a Russian version of the STAI (Hanin & Spielberger, 1983), support was found for the impact anxiety could have upon performance. Yet, a great individual

variation in anxiety intensities related to a successful performance, ranging from low to high, was also identified among athletes (Hanin, 1989). Hence, the importance of identifying the individual's own optimal zone of anxiety, in which the athlete would be able to perform at personal best, was highlighted. Moreover, the findings suggested a need to conduct intra-individual, in preference to inter-individual, comparisons of anxiety patterns (Hanin & Syrjä, 1996). According to the individual anxiety zone notion, the anxiety level was also assumed as being possible to predict several days prior to the event (Hanin, 1989; Hanin & Syrjä, 1996).

Using IZOF guidelines, the individual's optimal zone of anxiety is established by adopting an anxiety score related to the athlete's outstanding performance, and adding and subtracting four points (approximately one half standard deviation). The critical point is to identify an outstanding performance, which is either done by repeated assessments of anxiety over a period of time or by letting the athlete recall an event in which he/she performed outstandingly well (Raglin & Hanin, 2000). Research testing the predictions of the IZOF model, by use of both the STAI and the CSAI-2, has generally been supportive of the notion that athletes who are in their individually established anxiety zone perform more successfully than their out-of-the-zone counterparts. A meta-analysis, in which 19 studies that had applied the IZOF model to predict state anxiety were included, showed that athletes who were in their zone performed about one-half of a standard deviation better than athletes who were out of their zone (Jokela & Hanin, 1999). Athletes' ability to both recall and predict their anxiety levels on self-report scales was also supported. Yet, some studies have indicated that the IZOF model might be less accurate in predictions when athletes perceive the competitive situation as easy (Raglin, Morgan, & Wise, 1990; Salminen, Liukkonen, Hanin, & Hyvönen, 1995).

The IZOF model was later extended to include a range of subjectively experienced psychobiosocial states that Hanin (2000a, 2003) collectively labels as emotions. Three dimensions are suggested to describe these emotional experiences: (1) The subjective description of the experience, for example, as cognitive, affective or motivational (form), (2) the qualitative characteristics, for instance, positive/negative, optimal/non-optimal, facilitative/debilitative (content), and (3) the intensity and range of the optimal zone (intensity). Moreover, two additional dimensions are viewed as being valuable in understanding the dynamics of the experiences: the temporal patterning and change in emotional experiences before, during and after performance (time), and the environment and situation evoking the state, for example, practice or competition (context). Whereas the original IZOF work relied on standardised anxiety inventories (Hanin & Syrjä, 1996), a key assumption in the IZOF emotion approach is that similar emotional states can be either helpful or harmful to athletes. This is predicted to depend on

the idiosyncratic intensity and content of the athlete's experience (Hanin, 2000a). To account for the latter assumption, individualised procedures for emotional profiling were developed. Basically, to create individualised emotional profiles, athletes recall a best and worst performance and then select adjectives from lists (or generate their own adjectives) that they deem as personally relevant descriptors of their emotional experiences. The selected adjectives are then classified according to their idiosyncratic function (helpful or harmful) and hedonic tone (pleasant or unpleasant) and, finally, intensity is rated on a modified version of the Borg CR10 Scale (cf. Hanin, 2000a,b).

The ability of IZOF to predict the quality of upcoming performances based on the intensity and content zone notion of emotional experiences, in which bodily-somatic symptoms have recently also been included, has received support (Hanin & Syrjä, 1995; Robazza & Bortoli, 2003; Robazza, Bortoli, & Hanin, 2004). Importantly, the IZOF model presently does not hold the status of a theory but is instead a framework for qualitative and quantitative analyses of emotional experiences. From an applied perspective, this framework is suggested as being helpful in motivating and helping athletes to identify and apply their optimal affective pattern (Hanin, 2000a,b). Hence, a crucial limitation of the model is its lack of explanation as to why athletes might identify emotional states as functional or dysfunctional and how different emotions can occur (cf. Cerin et al., 2000; Jones & Uphill, 2004a). Furthermore, criticism has also been voiced concerning the lack of precise definition with regard to the adjectives used to identify emotional experiences within IZOF (Jones & Uphill, 2004a; Lazarus, 2000a). While researchers generally contend that it is appropriate to separate different discrete emotions (e.g., anxiety, anger, sadness) (Lazarus, 1991, 2000a; Power & Dalglish, 1997), many of the adjectives included in the IZOF appears to relate to undefined states of moods, motivation, attitudes and motives and not emotions *per se* (Lazarus, 2000a). Others (Davis & Cox, 2002) have suggested a potential overlap between the optimal emotional zones suggested by Hanin and the theoretical assumption of facilitative anxiety suggested by Jones (1995), yet this has thus far not been investigated among elite athletes.

6. Performance deterioration under pressure: The “why” question

The question of *how* anxiety and performance is related has traditionally received substantial attention in sport psychology research. Increased interest has also been directed toward the underlying mechanisms as to *why* anxiety can make athletes fail to perform well-learned skills (Beilock & Carr, 2001; Masters, 1992). Two main attention hypotheses are proposed to provide explanations: one suggests that distraction is the primary cause (Eysenck & Calvo, 1992), whereas the other suggests that anxiety increases the athlete's self-focus (Masters, 1992). These two hypotheses thus provide opposite explanations for the impact of anxiety on attention and performance (Beilock & Carr, 2001).

6.1 The perspective of distraction and reduced working memory capacity

The processing efficiency theory (Eysenck & Calvo, 1992) suggests that performance deterioration is a consequence of worrying thoughts, evoked by pressure, distracting the individual. More specifically, pressure makes individuals shift their attention from task-relevant cues to the worries perceived, and both have to compete for the limited attentional resources available in working memory. Empirical evidence has also shown anxious individuals to be biased to selectively attend to threatening information in preference to neutral information (Egloff & Hock, 2001; Mathews & MacLeod, 1994), which places additional demands on working memory resources. In some instances, worry is also predicted to serve a motivational effect by informing the individual about the importance of the situation, thus leading the individual to increase the effort in the task. This motivational effect will only occur if there is a subjectively experienced chance of succeeding and thereby avoiding any negative consequences (Eysenck & Calvo, 1992).

Because working memory is suggested to mediate the effect between heightened anxiety and task performance, support for process efficiency theory has been derived primarily from studies involving cognitive tasks (Derakshan & Eysenck, 1998; Eysenck, 1992; Eysenck & Calvo, 1992).

Sports performance involves both cognitive and motor performance components, whereby results have been less clear. Hardy and Jackson (1996) found some support for the second prediction of process efficiency theory among rock climbers. That is, climbers invested more effort and performed better when cognitively anxious. The general idea about the distraction hypothesis has nevertheless been questioned in sport psychology literature. For instance, in a series of experiments on golfers, Beilock and Carr (2001) failed to find support for any performance deterioration when the golfers were exposed to a distracting cognitive task (i.e., alphabet arithmetic task) simultaneous with a putting task. The theory was supported, however, when distraction and problem solving of difficult math tasks were investigated among highly qualified mathematicians (Beilock & Carr, 2005). These findings suggest that the distraction notion of anxiety might foremost be applicable on tasks with high cognitive demands (e.g., decision making and problem solving) whereas less evidence supports its applicability on well-learned motor tasks (Beilock & Carr, 2001, 2005).

6.2 The perspective of self-focus and interference with autonomous movements

The conscious processing hypothesis, sometimes also referred to as self-focused hypothesis or explicit monitoring (Beilock & Carr, 2001) has to date received increasing support as an explanation for performance deteriorations of anxiety in sports (Beilock & Carr, 2001; Beilock, Carr, MacMahon, & Starkes, 2002; Beilock, Wierenga, & Carr, 2002; Lewis & Linder, 1997; Mullen & Hardy, 2000; Pijpers, Oudejans, & Bakker, 2005; Pijpers, Oudejans, Holsheimer, & Bakker, 2003). The idea behind the hypothesis comes from theories on skill acquisition, suggesting that development of skills proceeds through different cognitive phases. Basically, in early stages of skill acquisitions the performer has to control movement in a step-by-step fashion, making movements slowly and with many errors. Consequently, the novice has to attend to how to execute every part of the task, which requires great attentional resources of the working memory. Practice makes the skill pass to an autonomous phase, in which the knowledge of how to perform the skill is internalised in motor programs, and cognitive control of how movements should be executed is no longer needed. Hence, resources from working memory are made available, the movements are effortless, smooth and coordinated, and the performer can easily attend to other tasks or cues without interruption (cf. Beilock & Carr, 2001; Masters, 1992).

Performance deterioration under pressure is suggested to occur because athletes become overly self-conscious, which might increase the need to gain conscious control. The athlete therefore begins to think about how the skill

should be executed. As a result, the attempt to control movements disrupts the normal and automatic processing, and the performance regresses to an earlier stage of skill acquisition (Masters, 1992). As Pijpers and colleagues (2003) stated: *“performing a learned task in a threatening situation can be considered as performing a “new”, unfamiliar task for which a new solution has to be found”* (p. 300). A number of recent studies, in which predominantly experimental designs have been adopted, have provided support for the conscious processing hypothesis when the skill is well learned (Beilock & Carr, 2001; Beilock et al., 2002a,b; Mullen & Hardy, 2000; Pijpers et al., 2003). These findings suggest that focusing on a distraction or other aspects of performance that are not involved in skill execution might actually benefit performance of well-learned skills (Beilock & Carr, 2001; Beilock et al., 2002a). Repeated exposure to a stressful competitive situation has also been proposed to teach the athlete not only how to perform the skill properly but also how to execute it under pressure (Pijpers et al., 2003). Mullen, Hardy and Tattersall (2005) failed to find support for the conscious processing hypothesis, but suggested that multiple mechanisms, including both conscious processes and distraction effects, might affect performance in a complementary manner depending on the nature of the task.

7. Conceptual and methodological issues

Whereas thorough reviews of a range of conceptual and methodological issues discussed in sport anxiety research can be found elsewhere (e.g., Burton, 1998; Gould et al., 2002; Jones, 1995; Raglin, 1992; Woodman & Hardy, 2001), some methodological concerns recently highlighted are of particular interest for the present dissertation. First, the large majority of studies conducted to test theoretical perspectives of the anxiety-performance relationship have been cross-sectional in character and have analysed inter-individual (i.e., between-subject) differences of subgroups of athletes (Woodman & Hardy, 2001). Yet, large individual differences in the anxiety levels that are beneficial or harmful to athletes' performance have been demonstrated repeatedly in studies (Raglin & Hanin, 2000). It has further been suggested that the intensity level of anxiety might not be the most crucial aspect for sports performance, but rather the individual's consistency of anxiety intensity across competitions (Raglin, 1992). Hence, empirical evidence suggests that the investigation of single anxiety scores by adopting group comparisons might not be the most appropriate approach when competitive anxiety is to be investigated. Still, relatively sparse research has applied longitudinal designs with intra-individual analyses of repeatedly assessed anxiety levels of the same athlete (Gould et al., 2002). These issues were taken under more thorough consideration in Study I.

Secondly, research on anxiety in sports has predominantly used standardised self-report inventories, of which the most popular inventory has been the CSAI-2 (Cox, Martens, & Russell, 2003; Craft et al., 2003). The inventory has long been regarded as psychometrically sound, and support for its internal consistency (Cronbach's alpha) has been repeatedly reported in studies (cf. Burton, 1998). Concerning support for the validity, until recently researchers have relied mostly on the initial validation studies conducted by Martens and associates (1990a). Based on concerns about methodological shortcomings of this initial work, for example that Martens and colleagues (1990a) used explorative factor analyses in preference to confirmatory factor analyses, adopted small sample sizes and relied on weak rationale for the inclusion of the self-confidence scale, Lane and colleagues (Lane et al., 1999) re-evaluated the factorial validity of CSAI-2 using confirmatory factor analysis. The results failed to support the hypothesised three-factor structure of the inventory, hence questioning the factorial validity of the CSAI-2. Replications of this study in both Greek and English speaking samples of

athletes have also arrived at the same conclusion (Cox et al., 2003; Isidfidou & Doganis, 2001; Tsorbatzoudis, Barkoukis, Sideridis, & Grouios, 2002).

Hypothesising about the explanations of the psychometric limitations discovered, the terminology of items has been criticised for allowing athletes to interpret statements differently (e.g., the word “concern” used in a majority of cognitive items as a substitute of the word “worry”) (Lane et al., 1999). Others have related the lack of factorial validity to the self-confidence subscale and suggested that the inventory might benefit psychometrically from its exclusion (Tsorbatzoudis et al., 2002). Attempts have also been made to revise the CSAI-2 by deleting items identified as weak, which resulted in a 17-item version (CSAI-2R) containing five cognitive, seven somatic, and five self-confidence items (Cox et al., 2003). The initial study testing the CSAI-2R indicated that the factorial validity increased substantially, which made the authors argue in favour of the revised version in preference of the original CSAI-2 (Cox et al., 2003). In light of the various distinct modifications of the CSAI-2 proposed, Study II was conducted to evaluate which of these modifications provides the most support in a truly independently drawn sample.

Critiques about psychometric properties of the CSAI-2 are also of relevance for the notion of debilitating and facilitative interpretations of anxiety symptoms proposed by Jones and colleagues (Jones, 1991, 1995; Jones & Swain, 1992). Whereas the proposal to include a directional scale as a complement to the intensity scale generally has received support, others argue that findings supporting facilitative interpretations of anxiety are merely a result of the use of poor assessments (Burton, 1998; Burton & Naylor, 1997). More specifically, the concerns refer to the wording of items in anxiety scales possibly being too neutral, leading athletes to interpret symptoms described as not only anxiety but also indicators of more positive emotional states. As Burton and Naylor (1997) stated: “*Competitive anxiety theorists must address the question of whether anxiety is really facilitative, or whether positive emotions such as challenge, excitement, or self-confidence simply have been mislabelled as facilitative anxiety*” (p. 296). In response to such criticism, others have underlined that it is not anxiety construct itself, but rather the symptoms associated with anxiety that athletes may interpret on a debilitating-facilitative continuum (Jones & Hanton, 2001; Mellalieu et al., 2003). Moreover, it is suggested that only a negative score on the direction scale displays anxiety, whereas a positive direction score instead indicates a conceptually different state that has previously been mislabelled as anxiety (Jones & Hanton, 2001). According to the latter view, similar symptoms could be expressed by conceptually different states, but the states would be possible to separate using athletes’ directional ratings. Others have also suggested the possibility that a total facilitative direction score simply might display the athletes’ belief that the symptoms will be beneficial to perform-

ance (Jones & Uphill, 2004b). Moreover, some point out that the task requested by athletes, to correctly predict the effect of specific anxiety symptoms on upcoming performances, is overly difficult (Raglin & Hanin, 2000).

An additional complicating matter is that intensity and directional scales of anxiety have been treated separately in statistical analyses. This approach has been questioned because individuals rate their direction score based on the perceived intensity level of the symptoms described in the anxiety inventory (Burton & Naylor, 1997). In the frequently used procedure of summarising intensity and direction scores separately, information of the intensity level that is related to the direction scores on each item disappears (Lundqvist & Kenttä, 2005). Moreover, the directional scale is bipolar, and an athlete rating debilitating and facilitative scores of an approximate similar number of items would misleadingly display a total direction score close to zero. Thus, these procedures make it difficult to interpret what differences in total direction scores across samples actually represent. More thorough investigations of the distinction of debilitating and facilitative interpretations of anxiety symptoms, regarding both conceptualisation and assessment approaches, are necessary in order to explore the precise nature of the directional finding of symptoms associated with anxiety. Furthermore, whereas the majority of studies investigating competitive anxiety have been conducted using standardised self-rating inventories, studies using qualitative methods to investigate athletes' anxiety responses in depth and detail have been relatively sparse (Hanton et al., 2002). Thus, Study III aimed to account for problems evident when total scores of the intensity and directional scales are analysed and interpreted separately, which was done by investigating the relationship between intensity and directional ratings on single items/symptoms of the CSAI-2R. Moreover, in order to provide detailed and contextualised information of the phenomena, Study IV investigated athletes' own idiosyncratic experiences of competitive events in which symptoms associated with anxiety had been perceived as debilitating and facilitative to performance.

8. Purpose and summary of the empirical studies

The purpose of the four interrelated studies included in the present dissertation was to study the effect of anxiety on individual sport athletes' performance with reference to the methodological and conceptual issues described in the previous section. Hence, Study I examined relationships between performance and both inter- and intra-individual variability of anxiety and self-confidence, using repeated assessments across a competitive season. Studies II and III evaluated common assessment approaches utilised in the study of anxiety in sports: first by evaluating the factorial validity of the CSAI-2 and modified measurement models later suggested, and second by investigating the assessment of intensity and direction of single anxiety symptoms. The latter was made with reference to the conceptualisation of anxiety symptoms as interpreted on a debilitating-facilitative continuum. Finally, in Study IV qualitative methodology was utilised to explore in-depth athletes' idiosyncratic descriptions of debilitating and facilitative anxiety symptoms experienced in relation to competition.

8.1 Study I: Intra-individual variability in state anxiety and self-confidence in elite golfers

Research has indicated that athletes vary significantly from one another in the level of perceived anxiety that benefits performance (Raglin & Hanin, 2000; Turner & Raglin, 1996). The reason for this variability is poorly understood, but some more stable psychological factors, such as trait anxiety and self-consciousness, have been associated with precompetition state responses (Eysenck, 1992; Hassmén, Koivula, & Hansson, 1998; Raglin & Turner, 1993; Turner & Raglin, 1996). Some athletes may also be consistent in anxiety values across competitions (either low, medium or high) whereas others may vary considerably from competition to competition (Raglin & Hanin, 2000). Hence, it is likely that the impact of anxiety on performance differs depending on the degree of anxiety variability. Unfortunately, research in which pre-competition states are assessed repeatedly across a full season and intra-individual variability explored is lacking (Gould et al., 2002). The aim of this study was therefore to examine elite golfers' precompetition anxiety variability, related to actual golf performance, in

their most important competitions across a full season. High anxiety and self-confidence variability was hypothesised as more negatively associated with performance than consistent levels. Associations between anxiety variability and self-consciousness, social anxiety and trait anxiety were also explored.

8.1.1 Method

The participants comprised eight male members of the Swedish National Amateur Golf Team (mean age=21.0 years; range: 18-23 years), who were followed during a full competitive season (March to October). The golfers participated in an average of 27 competitions ($SD=6.6$), but only the anxiety scores from the ten games judged as the most important by each player were included in the analyses. Two to four weeks before the competitive season, the players individually completed the Sport Competition Anxiety Test (SCAT; Martens et al., 1990b), which is designed to assess trait anxiety. The Self-Consciousness Scale (SCS; Fenigstein, Scheier, & Buss, 1975), containing subscales of Social Anxiety, Private Self-Consciousness and Public Self-consciousness was also completed. About 45 minutes before each competition during the season, all golfers also completed the Competitive State Anxiety Inventory-2 (CSAI-2; Martens et al., 1990a).

8.1.2 Results

The mean score of self-confidence showed a significant correlation to mean golf score ($r = -.73$), thus indicating a high degree of self-confidence to be related to a lower golf score. Analyses of intra-individual variability levels showed somatic anxiety variability to be significantly correlated to intra-individual variability of golf-score ($r = .82$). Closer inspection revealed two players as consistently low, and two players as consistently high in anxiety and self-confidence variability, whereas the remaining players showed a more irregular pattern. When typical anxiety levels were considered among participants with similar intra-individual variability, inter-individual differences were also evident. For example, one player showed a consistent pattern of relatively low anxiety intensity scores and high self-confidence, whereas another player showed an opposite pattern. Independent sample t-tests revealed that players in the low variability group scored significantly higher on private self-consciousness than did their high variability counterparts ($p < .05$), but no differences were displayed on the remaining trait scores.

8.1.3 Discussion

Despite the homogeneity of the sample, considerable inter-variability and intra-variability in anxiety and self-confidence intensity scores were evident. The relationship between variability of somatic anxiety and golf performance may have reflected the involvement of fine motor skills in golf (Landers & Arent, 2001), and indicated that performance may benefit from low variability of somatic responses. The findings further indicate that intensity level and the intra-individual variability of anxiety responses each provide with unique information when viewed in relation to golf performance. Moreover, trait factors may be partly responsible for this variability, but in a more complex manner than has previously been suggested. Inspection of individual trait anxiety scores showed an inconsistent pattern between trait and state anxiety. Considerable variability of social anxiety scores was also displayed. The order of the players with highest aggregated SCAT and Social Anxiety scores nevertheless follows the same order as for mean state anxiety scores, which is an interesting observation warranting future research. The higher mean score of private self-consciousness among players with low variability in state anxiety and self-confidence, compared to their high variability counterparts, suggests that awareness of one's own thoughts and feelings is related to the precompetition state responses experienced.

8.2 Study II: Competitive State Anxiety Inventory-2 (CSAI-2): Evaluating the Swedish version by confirmatory factor analyses

The Competitive State Anxiety Inventory-2 (CSAI-2; Martens et al., 1990a) has been used frequently in research to assess pre-competition state anxiety. Questions about the construct validity of the inventory and also the proposed shortcomings in the original validation studies underline a need for revalidation studies (Burton & Naylor, 1997; Lane et al., 1999). Confirmatory factor analyses conducted to date have failed to find adequate goodness-of-fit for the three inter-correlated factors suggested in the CSAI-2 (Cox et al., 2003; Iosifidou & Doganis, 2001; Lane et al., 1999; Tsorbatzoudis et al., 2002), but two alternative measurement models are proposed to improve the model fit: (1) a two-factor model in which the self-confidence subscale is excluded (Tsorbatzoudis et al., 2002), and (2) a three-factor model in which ten items identified as weak are excluded (CSAI-2R; Cox et al., 2003). However, the alternative measurement models proposed require evaluation and replication in independently drawn samples. Hence, the purpose of this study was to examine the psychometric properties, based on the measurement models pre-

viously suggested in the literature, of the Swedish version of the CSAI-2 using confirmatory factor analyses.

8.2.1 Method

A total of 969 students (571 men and 398 women with mean age 17.5 years; $SD=0.9$) studying at specifically designated Swedish sport high schools completed the CSAI-2. The competitive standards among the participants ranged from non-elite ($n=692$) to elite ($n=257$), and they competed in a variety of sports (individual sports: $n=642$ and team sports: $n=307$). The original CSAI-2 (Martens et al., 1990a) consists of 27 items that assess cognitive anxiety, somatic anxiety and self-confidence. Respondents rate their answers on a four-point scale that ranges from 1 (“Not at all”) to 4 (“Very much so”). Before the participants completed the CSAI-2, they were instructed to recall the most important competition they had participated in during the previous season, and refer to their state of mind immediately before that particular event. Confirmatory factor analyses were performed using EQS 5.7 (Bentler, 1995). To provide an increased understanding of the factor structure of the CSAI-2 in various samples, the participants were first grouped into samples of elite and non-elite athletes, and secondly, into samples of individual or team sports athletes.

8.2.2 Results

The results of both the original three-factor model and the two-factor model in which the self-confidence scale was excluded revealed an inadequate fit in all samples ($NNFI=.82-.86$, $CFI=.83-.87$, $SRMR=.06-.08$, $RMSEA=.08-.09$; 90% $CI=.07-.10$), AIC (three factor model: 162.14-971.10 and two factor model: range=104.96-448.53). The three-factor model with 17 items (CSAI-2R) showed an improved model fit, and all fit indices indicated an acceptable fit ($NNFI=.91-.92$, $CFI=.92-.93$, $SRMR=.05-.07$, $RMSEA=.06-.07$; 90% $CI=.05-.07$, AIC= -6.91 – 209.72). Inspection of the multivariate Lagrange multiplier test of the 17-item model (CSAI-2R) revealed the model fit to be significantly improved if three to six of the items were allowed to cross-load onto more than one factor. Moreover, in each of the samples, the items “*My heart is racing*” and “*My hands are clammy*” displayed relatively small squared multiple correlations (range: .24-.39 and .16-.24, respectively). Finally, a reliability coefficient was computed, which described the variance captured by measurement errors as opposed to the variance attributable to the latent factors. The results showed 43-59% of the total variance in the latent factors of CSAI-2R to be due to measurement errors.

8.2.3 Discussion

The results revealed that only the 17-item model (CSAI-2R; Cox et al., 2003) indicated an acceptable model fit in all samples, albeit not as good as was presented by Cox et al. (2003). Even if the subscales in the CSAI-2R indicated less error variance compared to the CSAI-2, the error variance for the cognitive and somatic anxiety subscales was generally higher than the variance captured by the constructs. Moreover, the CSAI-2 was revised to the CSAI-2R by a sequential process of deletion of ten parameters that cross-loaded significantly (Cox et al., 2003). Inspection of the local fit in the present study revealed that a number of predominantly cognitive and somatic anxiety items still double loaded significantly. Nevertheless, the results support the notion that the CSAI-2R is psychometrically sounder compared to the original CSAI-2, even though some doubts still remain about the amount of variance that can be attributable to error variance in the subscales.

8.3 Study III: Absence of facilitative anxiety responses in elite young athletes

Support has been presented for the notion that elite athletes interpret anxiety symptoms as more facilitative than their non-elite counterparts, despite a general lack of significant differences in mean anxiety intensity levels (Jones & Swain, 1992; Jones et al., 1993, 1994). Self-confidence is suggested to protect athletes from interpreting elevated levels of anxiety symptoms as debilitating (Jones & Hanton, 2001). This evidence was derived by examining total scores of anxiety intensity and direction separately, an approach that precludes the examination of the relationship between the direction score and the selected intensity level of each item. Thus, no published studies have compared the extent to which skilled or less skilled athletes recognise individual items as debilitating or facilitative in comparison to rated intensity. If facilitative rated items are rarely or never paired with at least moderate intensity scores, the notion that symptoms associated with anxiety, even at elevated intensities, can be interpreted by athletes as both debilitating and facilitative (Jones, 1995; Jones et al., 1993) would be unsupported. The purpose of this study was to examine the relationship between single intensity and directional scores of the CSAI-2R (Cox et al., 2003) in young elite and sub-elite athletes under the following hypotheses: (1) direction responses will be displayed across all various intensity scores reported for the entire sample, and (2) the elite performers will report a higher percentage of items rated as facilitative for performance than will sub-elite athletes.

8.3.1 Method

The study included two samples: The first comprising 59 junior cross-country skiers (36 men and 23 women) with a mean age of 17.6 years ($SD=1.1$). A total of 18 skiers were classified as junior elite skiers. To replicate the results in another sport, a second sample of 25 junior swimmers (12 men and 13 women) was also included. The swimmers were on average 16.9 years of age ($SD=2.0$), and 13 were classified as junior elite swimmers. Anxiety and self-confidence were assessed using a Swedish version (Lundqvist & Hassmén, 2005) of the CSAI-2R (Cox et al., 2003). To assess anxiety direction, a 7-point direction scale (-3="Very debilitating for performance" to +3="Very facilitative for performance") was also included after each CSAI-2R item (Jones & Swain, 1992). The participants individually completed the direction modified CSAI-2R approximately 45 minutes before their first start in an event judged as important in consultation with the team coaches.

8.3.2 Results

Chi-square analyses showed both skiers' and swimmers' intensity and direction scores on the cognitive and somatic anxiety subscales to be non-randomly distributed between possible response options ($p<.05$). Of all cognitive items rated as debilitating, 30% of the skiers' ratings and 56% of the swimmers' responses were paired with a moderate or high intensity score (i.e., 3 or 4). Of the facilitative responses, only one cognitive rating in each sample referred to a moderate intensity level (i.e., 3), and none to a high intensity (i.e., 4). On the somatic subscale, 28% and 25% of the skiers' and swimmers' debilitating ratings, respectively, were identified as being rated with at least moderate intensity level. In contrast, only 9% and 6% of the respective facilitative somatic ratings were paired with moderate or high intensity. Unexpectedly, the midpoint option on the directional subscale (0="Unimportant for performance") was the single most chosen response option on the scales in both samples, except for the cognitive subscale among the swimmers, where it was the second most chosen. Comparing the distribution of responses of the Elite and Sub-elite samples showed that the Sub-elite athletes rated a higher number of cognitive items as debilitating (40%) than the Elite athletes (28%), but approximately 40% of the responses in each sample (Elite sample=39% and Sub-elite sample=42%) were distributed on moderate or high intensity levels. The Elite sample instead rated a higher percentage of items as facilitative (Elite sample=47% and Sub-elite sample=34%). However, only 1% of the responses in each sample were paired with a moderate intensity level and no responses with a high intensity level. A relatively similar response pattern was also found for the somatic subscale.

8.3.3 Discussion

The first hypothesis was not supported, because the majority of items experienced at higher intensity levels were rated as debilitating. A total of 71% of all anxiety items identified as facilitative were paired with an intensity of “Not at all” (i.e., absence) and none of the 84 athletes studied, despite displaying moderate self-confidence, showed a tendency to rate elevated intensity of cognitive items as facilitative. The findings question previous theoretical explanations and suggest a facilitative directional score to be a consequence of low intensity of anxiety symptoms and high self-confidence. The final hypothesis was partially supported. In accordance with previous research, the results showed significant differences in total direction scores between Elite and Sub-elite skiers, but no differences in total intensity scores. Yet, closer inspection revealed no differences between Elite and Sub-elite athletes regarding how facilitative items were distributed on moderate or high intensity levels. Thus, differences obtained by analysing total directional scores, despite displayed lack of differences in total intensity scores, can not be considered as sound evidence that athletes interpret similar intensity levels as more facilitative. Previous research could therefore have inflated the importance and true incidence of facilitative interpretations of anxiety symptoms and caution is urged when previous results are considered.

8.4 Study IV: On the distinction between debilitating and facilitative states of competitive anxiety: An idiographic approach

Research has generally supported the need to not only assess anxiety intensity but also athletes’ positive or negative interpretation of anxiety symptoms. Some concerns have also been expressed, for example that anxiety could be confounded with more beneficial performance states or that facilitative directional ratings merely express the belief that the symptoms will be beneficial (Burton & Naylor, 1997; Jones & Uphill, 2004b). These concerns underscore the need to further investigate athletes’ perceptions of the states in order to increase the conceptual clarity of the anxiety construct. Qualitative studies have recently increased in number in anxiety research (Hanton & Connaughton, 2002; Hanton et al., 2002; Hanton, Mellalieu, & Hall, 2004), but qualitative research that investigates in depth what athletes perceive as discriminating between debilitating and facilitative interpretations of anxiety symptoms, in terms of intensity and emotional valence, is still limited. The purpose of this study was to obtain detailed information about Swedish junior national elite swimmers’ idiosyncratic experiences of

differences between states characterised by debilitating and facilitative interpretations of anxiety symptoms using in-depth interviews.

8.4.1 Method

Of a sample of 25 junior national elite swimmers (mean age=16.9; $SD=2.0$) with an average competitive experience on national or international elite level of 3.1 ($SD=2.0$) years, three females ($n=3$) and one male ($n=1$) were purposefully selected for individual interviews. The selection was based on the participants' different response combinations of intensity and direction on the CSAI-2R, which was completed prior to a qualification competition for the European Championships (cf. Study III). A semi-structured interview guide was used during the interviews and included: (1) Information, instructions and definitions of the constructs under study, (2) questions about the respondent's characteristics and athletic career, (3) questions about anxiety responses perceived prior to the qualification competition, and (4) questions about previous experiences of debilitating and facilitative anxiety symptoms. All interviews were approximately two hours in length, and were tape-recorded and transcribed verbatim. The transcript was sent back to each swimmer, who verified the correctness of the content. Data analysis was conducted following guidelines suggested by Côte, Salmela, Baria, and Russell (1993) and Tesch (1990), and the results were subsequently summarised into case stories.

8.4.2 Results

All swimmers interviewed had experienced a state of anxiety interpreted as debilitating to performance, which was described as intense symptoms of both cognitive and somatic anxiety. Debilitating somatic responses involved stomach discomfort but also symptoms such as extremely tense or stiff body and sensations of the teeth falling out of the mouth or the fingers going numb. Symptoms of debilitating cognitive anxiety included worries, doubts or fear about the performance (e.g., worry of becoming tired during the race, doubts about their physical condition or the consequences of failing/performing poorly). Debilitating anxiety symptoms were consistently regarded as highly unpleasant and as undesirable symptoms with powerful consequences (e.g., making the athletes throw up, cry or become mentally inaccessible) and generally resulted in impaired performance. One swimmer had managed to perform successfully despite perceiving intense debilitating anxiety symptoms, which was a result of extensive pre-competition preparations and an ability to focus attention on the race plan. None of the four swimmers, however, could recall any occasion when intense symptoms associated with anxiety had been interpreted as facilitative. A facilitative state of anxiety was instead described as low to moderate levels of cognitive anxiety, somatic anxiety or both. A crucial balance of a higher degree of positive states (e.g.,

confidence/motivating or energising thoughts) than anxiety symptoms was also emphasised. This facilitative state was generally described with labels such as being “psyched up”, “worried in a positive way”, “eager to perform”, “focused on the task” and “confident”.

8.4.3 Discussion

Described debilitating and facilitative anxiety symptoms differed considerably with regard to both intensity levels of anxiety and valence of emotional experiences. Thus the results do not support the traditional view that similar symptoms of anxiety are interpreted as either debilitating or facilitative. Only partial support was found for the theoretical view that perceived ability to cope and a positive view of goal attainment discriminates between debilitating and facilitative interpretations of similarly intense symptoms associated with anxiety (Jones, 1995). Instead, the facilitative state appears to be a result of that coping successfully has decreased anxiety symptoms to a lower, and therefore controllable, level. Two swimmers also emphasised the importance of focusing on tactical issues in the race plan instead of the technique when anxious, which closely parallels predictions in the conscious processing hypothesis (Masters, 1992). Thus, coping and mental preparation may not only be of importance for emotional regulation but also for choosing beneficial attentional strategies. Future research should strive to identify and separate symptoms, in terms of associated intensity and emotional valence, which truly indicate anxiety versus conceptually distinct emotions or beneficial states. This would benefit both the theoretical understanding of the constructs and the possibility to assess them more reliably.

9. General discussion

The following sections aim to summarise the main findings from the four empirical studies included in this dissertation and also to integrate them into the larger body of competition anxiety research. This integration will be conducted in consideration of the increased knowledge of competition anxiety that has evolved during the four years when the studies were performed. With reference to both the empirical findings and research reviewed in the theoretical background of the dissertation, implications for future competitive anxiety research and applications of this knowledge are also discussed from a broader theoretical perspective.

9.1 Psychometric issues of the CSAI-2

Concerns about the psychometric properties of the CSAI-2 have been increasingly expressed in the literature (Burton & Naylor, 1997; Craft et al., 2003; Lane et al., 1999), which has resulted in two separate modifications of the inventory being proposed: (1) a two-factor model, excluding the self-confidence subscale (Tsorbatzoudis et al., 2002) and (2) a 17-item three-factor model, excluding ten of the original items (Cox et al., 2003). The first modification was founded on concerns regarding the lack of theoretical justification for including a self-confidence subscale into the CSAI-2 (Lane et al., 1999). The 17-item model (CSAI-2R; Cox et al., 2003) was instead supported on statistical grounds that were based on results from the CFA. However, a core assumption regarding CFA is its theory-driven nature (Bollen, 1989; Long, 1983). Re-specification searches based solely on statistics, with no substantial justification, can lead to erroneous or superficial model improvements applicable only to the specific data set under consideration. Consequently, such statistical procedures to modify models, which by nature are exploratory and not confirmatory, run an apparent risk of revealing results lacking theoretical interpretability or validity (Bollen, 1989; Brannick, 1995; Kelloway, 1995). Even though Cox and associates (2003) found preliminary support for the 17-item model when their findings were cross-validated on a second sample, support for the validity of an inventory is an ongoing process. Moreover, Cox and colleagues did not account for the previously suggested modification to exclude the self-confidence scale.

In Study II, the two suggested model modifications were therefore cross-validated on an independently drawn sample to enable investigation of the trustworthiness of each modification previously proposed. The results showed that only the 17-item model (Cox et al., 2003) reached an acceptable model fit, which was true for all samples investigated. The results thus provide general support for the CSAI-2R when compared to the original version of the inventory. Yet, the results in Study II were less convincing than the findings reported by Cox and associates (2003), and displayed merely an acceptable, but not a good, model fit. A similar finding was also later reported when the English version of the CSAI-2R was re-evaluated (Terry, Lane, & Shepherdson, 2005), which suggests that continuous refinements of the inventory are warranted.

A limitation of Study II was that no statistical tests of invariance across the samples were conducted. Following guidelines by Byrne (1994) and step-wise constraining factor loadings, covariance and factor variance as equal across samples (but releasing any parameters identified by the Lagrange Multiplier test as non-equivalent in previous steps) preliminary analyses of invariance have later been performed on the same data used in Study II. The Chi-square tests between the baseline model and the increasingly stringent models were non-significant and thus support the invariance of CSAI-2R across elite and non-elite athletes (factor loadings: $\Delta\chi^2_{(14)}=22.61, p>.05$, covariance: $\Delta\chi^2_{(17)}=27.22, p>.05$, and factor variance: $\Delta\chi^2_{(20)}=30.25, p>.05$). Non-equivalence on a number of parameters in the model was, however, detected across the samples of individual and team sports athletes. Tests of factor loadings indicated non-equivalence ($\Delta\chi^2_{(14)}=30.67, p<.05$) that referred to two items on the cognitive factor ("*I am concerned about choking under pressure*" and "*I am concerned about performing poorly*") and to one item related to the self-confidence factor ("*I'm confident of coming through under pressure*"). Tests of parameters of covariance also indicated non-equivalence ($\Delta\chi^2_{(14)}=25.20, p<.05$) related to the covariance between cognitive anxiety and self-confidence. In addition, non-equivalence in parameters of variance was also detected ($\Delta\chi^2_{(16)}=29.78, p<.05$), which was related to the cognitive subscale. In the discussion section of Study II, future research was encouraged to also evaluate the model fit of CSAI-2R across men and women, but because of space limitations in the journal these tests were not performed at that time. However, preliminary analyses show an acceptable, albeit not good, model fit for both men (S-B $\chi^2_{(116)}=287.03$, NNFI=.93, CFA=.94, RMSEA=.051 (90% CI: .044-.059) and women (S-B $\chi^2_{(116)}=368.77$, NNFI=.90, CFA=.91, RMSEA=.075 (90% CI: .066-.083). Yet, the invariance of the CSAI-2R across men and women was not supported on a number of parameters: The test of factor loadings ($\Delta\chi^2_{(14)}=29.90, p<.05$) showed non-equivalence across men and women, which related to one item on the cognitive subscale ("*I'm concerned about choking*").

under pressure”). Most troublesome was, however, that all parameters of covariance ($\Delta\chi^2_{(16)}=33.80, p<.01$) and factor variance ($\Delta\chi^2_{(16)}=37.86, p<.01$) indicated non-equivalence.

The above analyses were conducted on the same athletes when split into different sub-samples, and are therefore preliminary and should be cross-validated onto other samples before being fully trusted. Together with the findings in Study II, they nevertheless support that the global model fit of the CSAI-2R is at an acceptable, albeit not good, level in all samples. The results also support that the model is invariant across samples of elite and non-elite athletes, but underscore that differences in mean values obtained by the CSAI-2R across samples of individual and team sport athletes or across men and women should be interpreted with caution. Mean score differences displayed by the latter samples could, rather than signifying true differences in anxiety and self-confidence, be affected by non-equivalence in the underlying constructs assessed by the scale.

As indicated in Study II, error variance of the CSAI-2R sub-scales was relatively high when compared to the variance captured by the latent factors, although it did decrease somewhat compared to the original CSAI-2. Surprisingly, error variance was even higher in the original English version (Cox et al., 2003) compared to the Swedish. Differences between the English and Swedish versions of the CSAI-2 were not compared statistically and could possibly be non-significant. Yet, the small differences in error variance could also be a consequence of translational issues, at least when the cognitive sub-scale is considered. As Lane and colleagues (1999) discussed, Martens and associates (1990a) decided to replace the word “worry” with “concern” in order to decrease social desirability in the cognitive items. Yet, this shift in wording may have decreased the precision with which cognitive anxiety is captured in the scale. The Swedish language makes less subtle distinctions semantically in this case than the English language does. The back-translation procedure of the CSAI-2 into Swedish resulted in “concern” being translated into the Swedish word “oro” because other Swedish words were deemed too distant from the meaning of the original English statements. This Swedish word is frequently used to account for both “worry” and “concern”, but is semantically more related to the English term “worried”. Whether or not these linguistic dissimilarities between the languages explain the small differences in error variance displayed cannot be determined using the available data. Thus, at this point it is merely a hypothetical notion warranting further investigation. Nevertheless, the results of the Swedish version of the CSAI-2 were overall in close accordance with the findings displayed for the English version, thereby supporting the scale being relatively unaffected by the translation process.

9.2 Anxiety and intra-individual variability

Study I followed what can be regarded as a traditional line of research and examined the performance-anxiety/self-confidence relationship. Still, it was also untraditional on at least two points: (1) A longitudinal approach was applied, which is relatively uncommon in sport anxiety research; (2) Not only was anxiety intensity accounted for but also players' inter- and intra-individual *variability* of anxiety and self-confidence intensity across several competitions. During the implementation of the study, the CSAI-2 was generally regarded as the standard inventory to apply in research to assess athletes' levels of competitive anxiety. When later submitted and subsequently accepted for publication in 2002, no revised version of the CSAI-2 had yet been published. Thus, in line with the wealth of competition anxiety research conducted to that date, the CSAI-2 was chosen to enable comparisons with previous research. The problems revealed about the factorial validity of the original CSAI-2 (Cox et al., 2003; Lane et al., 1999; Study II; Tsorbatzoudis et al., 2002), however, pose serious doubts about the trustworthiness of all findings obtained by studies utilising the inventory. As stated by Lane and colleagues: *"If the validity of measurement instrument is in question, then it is not possible to test the associated theory with any accuracy"* (p. 510). These doubts include also the results obtained in Study I. Because the CSAI-2R displayed improved factorial validity compared to the CSAI-2, it implies that the trustworthiness of the results in Study I would have increased if the revised version of the scale had been utilised. Thus, the data were therefore re-analysed including only the 17 items of the CSAI-2R in the analyses. Consistent with the results presented in Study I, the re-analyses showed mean scores of Cognitive anxiety as positively related to mean scores of Somatic anxiety ($r=.76, p<.05$), whereas mean scores of Self-confidence were negatively related to mean scores of Cognitive anxiety ($r=-.84, p<.05$) and Somatic anxiety ($r=-.93, p<.05$). Moreover, a significant correlation was still present between intra-individual variability in Somatic anxiety and intra-individual variability in Golf Score ($r=.80, p<.05$) but not between mean scores of Self-confidence and mean Golf scores. Considering the grouping of players in Study I, which was based on the golfers' predominant inter-individual response pattern, the size of the standard deviations was generally lower when re-analysed. Yet, the possible range of scores on all subscales in the CSAI-2R is also lower compared to the CSAI-2, which consequently influences the standard deviations and complicates direct comparisons. As displayed in Table 1, each player's general response pattern is nevertheless in close similarity to those obtained in Study I: Players previously classified as high variability athletes generally display considerably higher standard deviation than do players classified as low variability athletes. Thus, even if results obtained in studies utilising the CSAI-2 should be considered with caution, the findings obtained in Study I showed to be fairly robust across the CSAI-2 and the CSAI-2R.

Table 1. Re-analysed means, standard deviation (*SD*) for each player. Shown is also the original grouping (Group) of each player as presented in Study I.

Player	Cognitive anxiety			Somatic anxiety			Self-confidence		
	Mean	<i>SD</i>	(Group)	Mean	<i>SD</i>	(Group)	Mean	<i>SD</i>	(Group)
#1	6.9	2.3	High	8.1	1.0	Low	17.4	2.1	High
#2	5.4	0.7	Low	11.6	0.8	Low	14.9	0.8	Low
#3	7.7	1.8	High	10.7	2.4	High	14.8	1.3	Medium
#4	8.9	2.8	High	11.0	2.4	High	15.7	2.2	High
#5	6.2	1.6	Medium	9.9	2.6	High	15.1	2.5	High
#6	13.2	0.9	Low	14.0	1.3	Low	10.0	0.0	Low
#7	5.3	0.5	Low	7.4	0.5	Low	17.9	1.0	Low
#8	6.3	2.1	High	9.7	1.7	High	16.9	1.7	High

Both the original and the re-analysed results in Study I suggest that athletes' patterns of intra-individual anxiety variability across competitions might affect performance in a different manner than the specific intensity level does. Thus, inspecting athletes' degree of anxiety variability could provide unique information that constitutes an alternative dimension to the understanding of anxiety-performance relationship. For instance, some researchers have suggested, based on support for the conscious processing hypothesis (Masters, 1992), that athletes who are repeatedly exposed to high-pressure competitive situations may eventually learn to perform the sports skills properly despite responses of intense anxiety (Pijpers et al., 2003). By relating these suggestions to the findings in Study I, it seems plausible that athletes with considerable intra-individual variability of anxiety across competitions, by which they frequently encounter various intensity levels of anxiety, will need more time than low variability athletes for this learning to take place. At this point this is merely a hypothetical notion warranting further exploration because it could provide valuable knowledge about individual differences in athletes' ability to adapt to competitive pressure.

The results in Study I also indicated that athletes with low anxiety/self-confidence variability displayed higher private self-consciousness than did high variability athletes. This finding implies that high personal awareness of emotional reactions may be advantageous for athletes in coping with anxiety or regulating emotions to a preferred intensity level. As acknowledged in Study I, the analyses of relationships between trait scores and anxiety variability were explorative in nature and were also limited because of the small sample size. The results are nevertheless in close accordance with recent research suggesting that high self-consciousness, if expressed as emotional awareness and adaptively balanced between relevant aspects of self and the situation at hand, may increase athletes' ability to monitor and control internal states (Ashford, Karageorghis, & Jackson, 2005). Increased attention directed towards the self has also been linked with negative affect and an increase in cognitive anxiety (Martin & Debus, 1999). Moreover, a

central assumption in the conscious processing hypothesis (Masters, 1992) is that anxiety impairs performance because of increased self-consciousness that makes athletes gain conscious control over skill executions. Thus, beneficial or detrimental effects of private self-consciousness need to be considered in future research in relation to the specific reactions and focus of attention it elicits among athletes in different situations.

9.3 Facilitative interpretations of symptoms associated with anxiety

It is evident from the literature that two contrasting opinions are present regarding the need to assess anxiety direction in addition to anxiety intensity. The major criticism relates to the anxiety scales applied in research possibly rendering different interpretations of items possible and thus confounding anxiety with positively toned emotional states (Burton, 1998; Burton & Naylor, 1997). Other researchers argue for the importance of assessing athletes' directional interpretations of anxiety symptoms, but stress that it is not anxiety itself but the symptoms associated with the anxiety response that athletes, irrespective of intensity level, can interpret as either debilitating or facilitative for performance (e.g., Jones, 1995; Jones & Hanton, 2001; Mellalieu et al., 2003). Considering the latter explanation, it is surprising that researchers have spent so much effort on investigating total scores of the intensity and directional scales. Inventories with multiple indicators/items (e.g., the CSAI-2) rest on the assumption that these indicators together (i.e., total score) constitute an estimation of the latent construct assessed (e.g., Cohen & Swerdlik, 1999). Yet, no previous study has scrutinised the relationship of intensity and directional ratings on single items in the CSAI-2, despite the fact that such investigation should reveal information about athletes' interpretation of diverse symptoms associated with anxiety more accurately than the investigation of total scores.

When athletes' ratings of intensity and direction on single items of the CSAI-2R were investigated in Study III, a previously overlooked concern about the anxiety direction notion was revealed. The results showed that instances in which facilitative ratings were paired with moderate or high anxiety levels were rare. Noteworthy was that the majority (71%) of all facilitative rated anxiety items were actually paired with an intensity level of "Not at all". Moreover, not a single athlete included in the study, despite the fact that all samples revealed moderately high self-confidence, showed a tendency to interpret cognitive items at moderate or high intensity levels as facilitative. The latter was surprising, given that previous research suggests that (1) high self-confidence alters athletes' interpretations of anxiety symptoms to a facilitative rather than debilitating direction, and (2) the most

consistent support for facilitative ratings has been revealed on the cognitive subscale (cf. Woodman & Hardy, 2001).

The findings displayed in Study III are important conceptually and suggest an alternative explanation for the notion of facilitative interpretations of anxiety symptoms. Facilitative total direction scores could, at least with regard to the cognitive subscale, simply be the result of absent or low experienced intensity of anxiety symptoms paired with a high self-confidence. This pattern would also explain previous research results that have shown “facilitators” as more self-confident, to label their emotional experience with more positively toned feeling descriptors, and to report a higher perception of being under control than their “debilitative” counterparts (Jones & Hanton, 2001; Mellalieu et al., 2003). Thus, researchers need to take a pause in the ongoing debate over which state (i.e., anxiety versus an undefined positive state) facilitative total direction scores of the cognitive subscale of the CSAI-2 represent, and instead carefully consider the notion that such scores can merely display self-confidence assessed in a confusing and overly complicated manner. Moreover, if future research supports facilitative direction scores being primarily characterised by self-confidence and not by anxiety, it is conceptually incorrect to label such scores as “facilitative anxiety” or to ascribe them any label that implies that athletes interpret symptoms associated with anxiety as facilitative. A pattern of low anxiety and high self-confidence should also readily be expressed by inspecting each athlete’s intensity scores on the anxiety and self-confidence subscales, thus questioning the usefulness and rationale of utilising a separate directional scale. Regarding the somatic subscale, a similar trend was found as for the cognitive subscale. Yet, a slightly higher percentage of facilitative ratings were rated at a moderate or high intensity level. The somatic subscale was originally developed to assess athletes’ perceptions of physical reactions of increased arousal, which was predicted as particularly harmful for fine-motor skills (Martens et al., 1990a). Thus, debilitative or facilitative interpretation of somatic symptoms will likely be a function of whether the perceived intensity levels of symptoms indicating arousal are viewed as adequate when related to the nature and demands of the athletes’ sport.

The findings from Study III further question the statistical procedures commonly applied within anxiety direction research and indicate a severe methodological flaw. Extensive research has shown that sub-groups of athletes differ significantly on the total direction scale but not on the total intensity scale. The results in Study III were in line with this research and differences across elite and sub-elite skiers were only displayed in total direction scores. Noteworthy was that closer inspection of the results revealed that elite and sub-elite athletes did not differ regarding how debilitative or facilitative ratings were distributed on moderate or high intensity levels. Differences in directional ratings across the samples were only

displayed on items either not experienced at all or experienced at a low intensity. Low intense symptoms are by their nature likely to be vaguely perceived, which could also affect the directional ratings. These findings demonstrate that differences in total direction scores could actually be a result of any (concealed) response combinations of intensity and direction on single items. Thus, results obtained by analysing total scores of intensity and direction separately provide no information about, and cannot be regarded as valid evidence for, particular sub-groups of athletes interpreting *similar* intensities of *similar* symptoms as more facilitative for performance than other sub-samples. It is therefore unfortunate that published research to date has not truly investigated the relationship between intensity and direction of anxiety symptoms, and has not presented their results in a manner that allows inspection if they actually provide any evidence for a debilitating-facilitative distinction. Until such results are published, it must be concluded that sound evidence is presently lacking and research may have exaggerated the importance and true incidence of facilitative interpretations of anxiety symptoms.

Alternative explanations to the findings displayed in Study III are, however, also plausible. The low occurrence of facilitative ratings paired with elevated intensity levels could also be a result of that weak items in the CSAI-2 was excluded in the CSAI-2R used in Study III. If so, the occurrence of directional interpretations of symptoms should basically be a consequence of psychometric limitations of the CSAI-2 and the entire directional dimension to be referred to a few items. Moreover, the lack of intensity among facilitative rated items could also result because items in the Swedish version of the CSAI-2R, due to translation, correspond more closely to the core of the anxiety construct than do those in the English version (cf. General discussion, section 9.1 about the Swedish translation of the word “concern”). As also suggested elsewhere (Burton, 1998; Lane et al., 1999), athletes might be more apt to interpret the word “concern” in a challenging manner compared to the word “worry”, and therefore also rate perceived intensity of symptoms on such items as facilitative on the direction scale. Whereas these issues indeed have been claimed previously, they also need to be explored empirically. Related to the findings in Study III, it would be particularly interesting to investigate whether response patterns of intensity and direction scores on single items actually differ depending on which word (concern versus worry) is utilised in the items. If a greater incidence of facilitative ratings paired with moderate or high intensity level is displayed when “concern” is used compared to “worry”, it would certainly suggest that the wording of the inventory should be changed to more accurately capture expressions of anxiety.

The above reasoning relates primarily to quantitative studies in which debilitating-facilitative interpretations of anxiety symptoms were explored

using inventories such as the CSAI-2. Results from qualitative studies nevertheless seem to support the major concerns expressed. Yet, a limitation with many of the studies is that anxiety “debilitators” and “facilitators” interviewed have been identified solely based on the summated direction scores of the CSAI-2 (Eubank & Collins, 2000; Hanton & Jones, 1999). Alternatively, no quantitative reference values whatsoever are provided to evaluate the intensity level that athletes’ descriptions of debilitating or facilitative symptoms refer to (Hanton & Connaughton, 2002; Hanton et al., 2002, 2004). This implies, once again, that little consideration is given to the intensity level, paired with the “debilitative” or “facilitative” anxiety symptoms perceived. Athletes identified as “facilitators” nevertheless appear to label their responses, for example, as “being relaxed, positive, focused, perception of readiness or feeling of being under control” (cf. Eubank & Collins, 2000; Hanton & Connaughton, 2002; Hanton et al., 2004). These descriptions signify foremost positive symptoms and seem to indicate that any anxiety symptoms perceived are relatively low in intensity. The findings of Study IV are also in line with previous results, and a “state with facilitative interpretations of anxiety symptoms” was described, for example, as being “psyched up”, involving energising/motivating thoughts, or being characterised by a perception of challenge, readiness and eagerness to perform. Anxiety symptoms were also mentioned as part of this state, but when the intensity levels were accounted for the symptoms showed to be less intense than, for example, self-confidence and positive thoughts simultaneously perceived. In contrast, debilitating symptoms of anxiety were described to constitute a highly unpleasant, uncontrollable and undesirable state that involved intense levels of both cognitive and somatic anxiety symptoms.

The findings in Study IV were obtained from only four athletes and the possibility to generalise the results is therefore limited, but the results correspond closely to previous proposals in the literature. Jones and Hanton (2001), for example, hypothesised that the state labelled “facilitative anxiety” in earlier literature might involve both experiences of anxiety and positively toned states, but that the positive experiences in such instances have outbalanced the anxiety symptoms perceived. Considering the findings in Study III, it is questionable that any positive state other than self-confidence is captured by facilitative directional ratings obtained by the CSAI-2R. It is nevertheless very likely that other emotions (not assessed by anxiety scales) are involved when athletes respond to competitive pressure. Indeed, the presence of a negative bias in pre-competitive emotional research conducted thus far has been increasingly highlighted. Whereas plenty of research has attempted to understand the effect of anxiety on performance, the impact of discrete positive emotions that facilitates performance, and possibly also buffer against negative effects of anxiety, has remained largely unexplored (Skinner & Brewer, 2004, Thatcher, Lavalley, & Jones, 2004).

Thus, based on the findings in Studies III and IV and suggestions provided in previous research, the facilitative pre-competitive state described by athletes in qualitative studies is likely to be characterised by self-confidence, no or low levels of anxiety, but likely also conceptually distinct positive emotions not captured by anxiety inventories.

9.4 A model to decrease conceptual “bewilderment”

Studies investigating competition anxiety have commonly conceptualised anxiety based on the CSAI-2, and the directional distinction that has evolved seems to be an attempt to adapt the anxiety theory to the inventory used. This is a somewhat awkward approach and is particularly troublesome in light of the psychometric weaknesses revealed about the CSAI-2. Related to the findings discussed in previous sections, Figure 1 elaborates on previous models (e.g., Cerin et al., 2000; Lazarus, 1991) to provide a summary and clarification of some of the issues regarded as central in the debated issue of debilitating and facilitative interpretations of anxiety symptoms. Considering the questionable methodological and statistical procedures applied in previous research (cf. General discussion, section 9.3), evidence is presently lacking for self-confidence moderating athletes’ *interpretations* of anxiety symptoms at elevated intensity levels as well (e.g., Jones, 1995; Jones & Hanton, 2001). Facilitative anxiety items were instead found as overwhelmingly rated at no or low intensity levels (Study III). In contrast to Jones’ model (1995), elevated self-confidence is therefore suggested to be accompanied with low intensity levels of anxiety symptoms (or vice versa). Moreover, debilitating or facilitative ratings obtained by the directional scale are predicted as strongly related to high and low perceived intensity of anxiety symptoms, a notion in need of further exploration as it has been highly overlooked in previous research. Thus, Figure 1 separates anxiety and self-confidence in a manner that schematically underscores the need for researchers to investigate the relative proportion of intensity that an athlete simultaneously perceives by each symptom and/or state. Apart from athletes’ skill level (e.g., elite or non-elite status), differences in directional interpretations have also been suggested to be a function of, for example, personality, situational characteristics (e.g., Hanton & Jones, 1997; Jones & Hanton, 1996; Jones & Swain, 1992; Perry & Williams, 1998) and the nature of the sport (e.g., Hanton et al., 2000; Mellalieu et al., 2004). Thus, future research should investigate whether the response pattern (low intensity/facilitative ratings and high intensity/debilitating ratings) is also obtained in samples varying in other characteristics proposed.

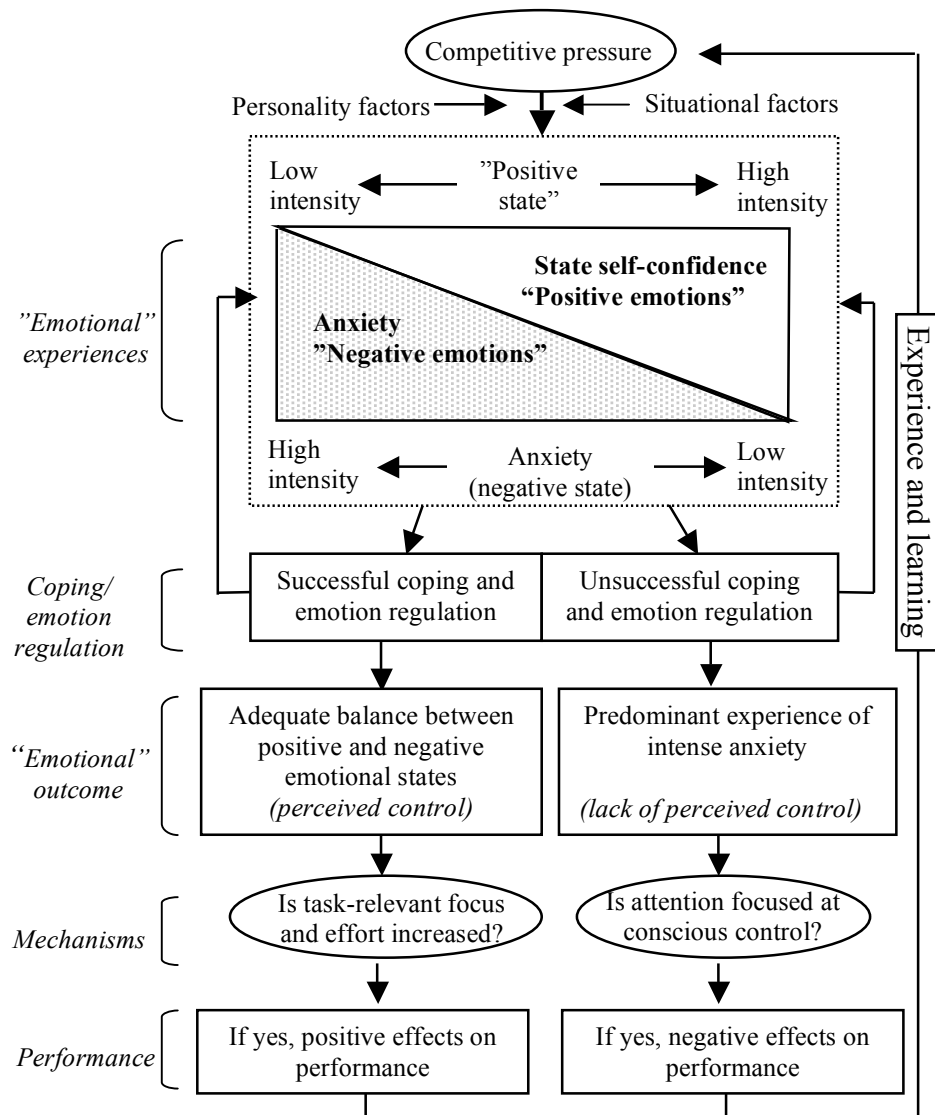


Figure 1. Integrated working model of anxiety, positive performance states and mechanisms that affect performance

In addition, researchers need to explore other emotions that, apart from anxiety, are likely to be involved when athletes respond to competitive pressure (Skinner & Brewer, 2004; Thatcher et al., 2004). "Negative" (harmful) and "positive" (beneficial) emotions are therefore included in the model as part of the emotional experience (see also General discussion, section 9.5). In contrast to what some scholars have previously suggested (e.g., Jones & Hanton, 2001), these "other emotions" are unlikely to be

captured by anxiety scales or directional interpretations of anxiety symptoms. Thus, positive or beneficial emotions should not be confounded with what has previously been labelled “facilitative interpretations of anxiety symptoms” (Study III). In the model, they are therefore separated from anxiety and self-confidence to emphasise the fact that they constitute distinct constructs.

In line with previous models (e.g., Lazarus, 1991), coping and emotional regulation is viewed as an important and integrated part of athletes’ emotional responses to competitive pressure. Perceived controllability of the situation is not seen as moderating athletes’ interpretations of anxiety symptoms, as was suggested by Jones (1995). Perceived control is rather viewed in the model as a consequence of coping strategies and emotional regulation having been successful. Thus, if the athlete is successful in regulating the emotional response to an intensity level perceived as adequate for performance, which will be dependent on the task at hand and the nature of the sport, this state is predicted to provide beneficial effects on sports performance (e.g., increased motivation, energy and task relevant focus; Jones, 2003; Vallerand & Blanchard, 2000). Moreover, this state will likely correspond to descriptions such as being “psyched up” or “on the edge” (e.g., Hanton & Connaughton, 2002; Study IV) and a “facilitative (anxiety) performance state” (Eubank & Collins, 2000; Hanton & Connaughton, 2002; Hanton et al., 2004; Jones & Hanton, 2001; Mellalieu et al., 2003; Study IV). In contrast, elevated intensity levels of anxiety that outbalance self-confidence and positive or beneficial emotions are suggested to correspond to the label of “debilitative anxiety” previously used in the literature. Thus, this state is predicted to generally be accompanied by a perception of lack of control and to increase the risk of detrimental effects on performance.

An important area in need of further exploration relates to the mechanism responsible for the effects of anxiety on performance. In sport psychology research, support has been presented particularly for the conscious processing hypothesis (Beilock & Carr, 2001; Beilock et al., 2002a,b; Lewis & Linder, 1997; Mullen & Hardy, 2000; Pijpers et al., 2003, 2005), which states that harmful effects on motor-tasks result when anxiety increases self-focus and thereby athletes’ attempts to consciously control well-learned movements. Thus, this “self-focus” mechanism is included in the model as one possible explanation. Yet, the mechanism will likely also depend on the nature of the sport and the task (e.g., cognitive or motor-tasks, complex or easy tasks). Thus, researchers are encouraged to more precisely establish the conditions under which different mechanisms (i.e., self-focus or distraction), or possibly the combination of the two, influence performance. Moreover, athletes who perform successfully despite perceiving intense levels of anxiety are an interesting phenomenon warranting further explanation. These cases have been suggested to result from the athletes, due to repeated

exposure to such situations, having successfully learned to perform the athletic skills correctly under competition pressure (Pijpers et al., 2003). This hypothesis is included in the model as “experience and learning”. An extension of this hypothesis, also in need of further investigation, is that the “learning of skill execution under pressure” might be affected by the athletes’ consistency or degree of intra-individual variability of anxiety level across competitions (cf. General discussion, section 9.2).

It should be noted that the model does not intend to account for emotional responses, for example, when athletes participate in easy competitions. In such instances, anxiety will most likely be absent and experiences indicating an under-aroused state, such as being “too relaxed”, “too calm” or “over-confident” could instead be perceived as detrimental to performance. Nor is it claimed that the model is exhaustive; it should rather be viewed as a clarification of some conceptual distinctions that thus far have been discovered in research. Hence, future research is encouraged to further explore and elaborate on the proposed model, and one topic of particular relevance is further separating and more carefully exploring distinct components of what the model labels as “negative” and “positive” emotions.

9.5 In search of performance-relevant emotions

The IZOF approach has provided important information about athletes’ idiosyncratic experiences of competition-related responses. Hence, it should be credited for shedding light on beneficial or positive emotional states in addition to detrimental or negatively toned states such as anxiety. The individualised scales applied by the IZOF framework, in which athletes choose or generate only idiographic items deemed personally meaningful, are also more sensitive to emotional experiences compared to standardised, nomothetic questionnaires (Hanin, 2000a). The idiographic scales are also limited because they make comparisons of findings across athletes or studies overly difficult (Jones, Lane, Bray, Uphill, & Catlin, 2005). Moreover, in their present form they do not differentiate between conceptually distinct emotional or cognitive states such as mood, emotions, motives or attitudes (Lazarus, 2000a). Thus, the procedures advocated by the IZOF approach are more adequate to view as the study of affect rather than emotions and are, in addition, likely to predominantly provide descriptive data of athletes’ responses to competition.

Researchers also need to go beyond the descriptive level and explore, for instance, why athletes differ in their optimal emotional states or the mechanisms involved when emotions affect performance. Such research needs a sound base for theory testing, and alternative approaches than the IZOF need to be considered. The work by Lazarus (1991, 1999, 2000a) has

recently received renewed attention in sport psychology (Jones et al., 2005; Uphill & Jones, 2004), aiming to identify and explore discrete emotions of relevance for sports performance. Accordingly, discrete emotions are regarded as being tied to distinct characteristics by the appraisals and specific core relational themes (cf. “Basic and discrete emotion”, section 3.2). This differs from the IZOF approach in which emotions are referred to as highly idiosyncratic and relatively undefined psychobiosocial states. With the exception of anxiety, sport emotion research on discrete emotions is still in its infancy (Jones & Uphill, 2004a; Uphill & Jones, 2004). Identification of clearly defined and distinguishable characteristics of different emotions will increase the possibility to conduct both within- and between-subject designs in studies. Moreover, tests of the underlying theoretical assumptions and comparisons of findings across studies or over time will be increased. The athlete-generated expressions provided by the IZOF are a valuable source of descriptive data that could also be used, for example, to screen out, categorise and later confirm discrete emotions identified as vital for athletes (Cerin et al., 2000; Jones et al., 2005). Thus, the IZOF and the perspective of discrete emotions are not necessarily competing alternatives. As discussed by Lazarus (2000b), both analytic and descriptive knowledge are needed in research to both explore the functionality of emotions and synthesise pieces of knowledge into a whole.

9.6 Reflections on future assessment of anxiety and other emotions within sports

There is little reason to doubt that anxiety will be of continued interest in future sport psychology research, studied as either a single construct or part of a broader emotional perspective. The results of Study II, which displayed acceptable but not good model fit, and complimentary analyses of invariance that indicated non-equivalence across sex as well as across individual and team sports athletes, highlight problems with the CSAI-2R that future research needs to resolve. Moreover, the results in Study III unexpectedly showed “unimportant for performance” to be the single most frequently chosen response option when the direction scale was added to the CSAI-2R. A majority of these ratings were paired with low intensity, and may therefore truly indicate that a low intensity level of symptoms was not perceived to impact performance. The low intensity level revealed could nevertheless also be a consequence of the symptoms being poor indicators of competitive anxiety, thus being seldom perceived and regarded as irrelevant for sport performance. If future findings end up supporting the latter possibility, this would suggest that some or all items should be refined or replaced with more valid anxiety indicators. Alternatively, the development of a new anxiety inventory is badly needed. Thus, future research should thoroughly

investigate the validity of anxiety indicators presently included in the CSAI-2R and strive to increase the availability of psychometrically sound inventories to assess competition anxiety or related performance states.

Researchers have also suggested that, in addition to cognitive and somatic anxiety, it could be beneficial to include components such as social anxiety (Study I), worry about injury and worry about physical harm (Dunn, 1999; Dunn & Syrotuik, 2003) in anxiety inventories. Emotions like anxiety are generally regarded as responses to specific objects (e.g., Lane & Terry, 2000; Vallerand & Blanchard, 2000). Thus, a more narrow classification of anxiety connected to its sources could provide valuable information about, for instance, when adequate intervention strategies should be chosen or studied in applied settings. The nature and demands of various sports differ considerably, and a narrow specification of anxiety sources therefore implies that such scales must be relatively specific to each sport, or specific to sports that are in close similarity. The benefits obtained by very specific scales should be weighted against the limited possibilities such scales provide to generalise the findings to other sports or settings (Gauvin & Russell, 1993). Thus, when assessment aims to investigate general effects or mechanisms of anxiety on performance, narrow distinctions of sources to anxiety would be less pertinent and would also be a limitation to the development of a more general body of knowledge.

Developments of assessments should further be viewed as closely interconnected with the increased theoretical understanding of athletes' emotional responses to competition. Considering this interplay, the main premise for assessing cognitive and somatic anxiety separately was built on the distraction hypothesis, in which cognitive anxiety in particular was viewed as harmful to sports performance (Martens et al., 1990a). More recent research has displayed increased support for the conscious processing hypothesis (Masters, 1992) in preference to theories of distraction (Eysenck & Calvo, 1992; Wine, 1971), at least within sports with high demands for well-learned motor skills. Arguments previously presented for a distinction between cognitive and somatic anxiety therefore appear today to be less supported theoretically regarding highly skilled athletes in many sports. If research provides further support for the notion that anxiety overall has its major impact on motor-performance through mechanisms in attention, and not through separate effects of the cognitive and somatic symptoms perceived, this would imply that the separation of cognitive and somatic anxiety in such instances provides redundant information. Thus, the decision to include fewer or additional dimensions in future anxiety scales needs to be carefully considered on the basis of the purpose of the assessment and the underlying theoretical perspective assumed.

Considering anxiety as part of a broader emotional framework, it is encouraging to note that a nomothetic scale, specifically designed to assess a spectrum of discrete emotions in competitive sports, was recently proposed (i.e., The Sport Emotion Questionnaire; Jones et al., 2005). Bearing in mind the psychometric weaknesses detected with the CSAI-2 after many years of usage, it is important that this new scale as well as future scales presented continuously are exposed to rigorous tests on their psychometric properties. Considering the Sport Emotion Questionnaire, the initial validation studies performed provided support for the psychometric soundness of the scale. But as also acknowledged by Jones and colleagues (2005), the findings should be cross-validated onto other samples before being fully trusted. This seems of particular relevance for the factor validity of the scale, because although the EQS software (i.e., statistical computer program for structural equation modelling) was utilised, the aim of the analyses was to reduce the initial item pool to an adequate number of items. Hence, referring to the same reasoning as when the CSAI-2 was modified to the CSAI-2R (see General discussion, section 9.1), the analyses performed were data-driven in nature and were thus not truly confirmatory. Moreover, whereas this emotion scale includes three unpleasant emotions (i.e., anger, anxiety and dejection) and two pleasant emotions (i.e., happiness and excitement), further research is likely to identify additional emotions that are of relevance for sports performance. In line with the work by Jones and colleagues (2005), emotions identified should be clearly defined and based on a strong theoretical rationale. The latter is important in order to reduce the risk of “jingle-jangle fallacies”; that is, scales that label a single emotion differently or ascribe the same label to different emotions (Marsh, 1994), because such fallacies induce conceptual confusion in the research field.

Not only is an increased availability of sound self-report inventories needed in research, a greater use of qualitative approaches would also be valuable in order to understand athletes’ emotional experiences more in-depth and place them in a broader or more holistic context (Hanton & Connaughton, 2002; Hanton et al., 2004; Study IV). Moreover, there has been a call for studies that provide information about emotional changes, not only prior but also during competitions (e.g., Butt, Weinberg, & Horn, 2003). Such research is still sparse, because interrupting athletes to complete assessments while they are performing is generally intrusive and therefore evokes both practical and ethical concerns. Interviews conducted in close proximity to the finish of the competition, in which athletes recall the emotions just perceived and relate them to the performance, could instead be used as a retrospective estimation of the emotional processes present during competition. Retrospective recall clearly has its limitations, such as recall failures and memory decay, even though these limitations are not exclusively linked to the use of qualitative approaches. Athletes’ memory processes could nevertheless be stimulated by the use of video recordings of the competitions or by letting the athletes

inspect their own scores of inventories completed prior to and after the competition (Burton, 1998). Moreover, it would be advantageous to compare the information obtained by athletes with observation protocols completed by each athlete's coach, because coaches are generally well acquainted with their athletes' emotional response pattern under pressure. Overall, a greater interplay between both qualitative and quantitative approaches in future research will be advantageous in broadening the understanding of the variables involved in the emotional responses in pressure-filled achievement situations.

9.7 Considerations for applied research and field settings

Implications for future applied research and work with athletes have been mentioned in a scattered manner throughout this dissertation, but the main suggestions are briefly summarised in this section. Because emotional research within sport psychology has predominantly paid attention to understanding the anxiety-performance relationship, a majority of the coping strategies traditionally recommended in the literature have also been designed to decrease or actively control the anxiety level encountered (e.g., Hardy, Jones, & Gould, 1996). Research suggests that anxiety can affect motor performance by increasing a desire for conscious control over movements. These findings imply that implementation of skills that help athletes shift attention away from movement execution will play a "protecting" role for motor performances in highly anxiety-inducing situations (Beilock & Carr, 2002; Study IV). There is also an increasing acceptance that not only anxiety but also positively toned emotions should be considered. Hence, in contrast to the mere focus on the negatively toned or maladaptive emotional responses, applied research and work also need to further explore and sophisticate cognitive strategies that help athletes to alter appraisals of the situation and to enhance, maintain and utilise positive/adaptive emotions (Cerin et al., 2000; Jones, 2003; Skinner & Brewer, 2002, 2004). The latter might be particularly important to consider because research has also shown that attempts to avoid negative states may paradoxically maintain the negative states (cf. Orsillo, Roemer, Block Learner, & Tull, 2004; Wegner, 1994).

Moreover, preliminary qualitative findings indicate that through experience, highly anxious athletes can develop an acceptance of their performance-related emotions, which apparently result in a performance state perceived as more beneficial to the performance (Hanton & Jones, 1999; Study IV). Such findings suggest that the notion of mindfulness and acceptance, which has received support in the cognitive behavioural therapy literature (Orsillo et

al., 2004), could also be applicable in sport contexts (Gardener, 2005; Gardener & Moore, 2004; Study IV). When implementing acceptance strategies, the focus is to increase the individual's awareness of the internal processes but, importantly, also to learn to accept and let go of the responses instead of paying unnecessarily attention to the discomfort or worry perceived (Gardener & Moore, 2004). Whereas the support for this notion is derived primarily from therapy of clinical anxiety syndromes (cf. Orsillo et al., 2004), systematically conducted intervention studies that investigate the usefulness of acceptance strategies with a non-clinical population of athletes are warranted. As noted by Martin, Vause, and Schwartzman (2005), there is also a general need in sport psychology for well-designed intervention studies that actually compare the effectiveness of various suggested interventions.

9.8 Concluding remarks

The findings in the present dissertation span primarily psychometric, methodological and conceptual matters. It can be concluded that support for the conceptualisation of “facilitative interpretations of anxiety symptoms” is presently weak. Previous results supporting the importance of anxiety direction should be interpreted with caution, as findings could basically originate from poor assessment procedures or statistical techniques applied. Moreover, future research should put effort into the development of more sound anxiety inventories and carefully consider how the competitive emotional states under investigation should be conceptualised more accurately. As suggested by the working model proposed in the present dissertation, these conceptualisations should particularly strive to further distinguish positively toned/adaptive emotions from negatively toned/mal-adaptive ones. Such efforts will enable a more thorough investigation of the interplay, patterns of variability and unique mechanisms of distinct emotions on sports performance. In line with a range of research areas within the general field of psychology (cf. Snyder & Lopez, 2005), a continuous movement toward positive psychology has indeed been evident within sport emotion research during the past years. To date, research presented in the literature also suggests that this trend, in which not only anxiety but also positive emotions are accounted for, is a beneficial gateway for the further development of a sound knowledge base of athletes' emotional responses to competition.

10. References

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