

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

**THE ROLE OF EMOTIONAL INTELLIGENCE IN
SPORTS PERFORMANCE**

By

David T. Crombie

**This thesis is presented for the degree of
DOCTOR OF PHILOSOPHY
In the Department of Human Biology
UNIVERSITY OF CAPE TOWN
SOUTH AFRICA**

July 2011

Supervisor: Prof. T. Noakes

**UCT/MRC Research Unit for Exercise Science and Sports Medicine
Sports Science Institute of South Africa
Boundary Road, Newlands, 7725
South Africa**

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	VI
DECLARATION	VII
LIST OF PUBLICATIONS	VIII
CONFERENCE PROCEEDINGS	IX
LIST OF FIGURES	X
LIST OF TABLES	XII
OUTLINE OF THESIS	XIII
CHAPTER 1: History of the construct emotional intelligence	1
1.1 Cognitive and non-cognitive intelligence	
1.1.2 Cognitive intelligence conception of human performance	
1.1.3 Non-cognitive intelligence conception of human performance	
1.1.4 Duality of cognitive and non-cognitive intelligence conception of human performance	
1.1.5 Emotion and human performance	
1.1.6 The emergence of emotional intelligence as a discreet scientific construct and non-cognitive intelligence driver of human performance	
CHAPTER 2: Measurement of emotional intelligence	13
2.1 Scales based upon definitions of EI and measurement approach	
2.2 Ability model narrow definition of EI and ability measurement approach scales	

2.3 Mixed model broad definition of EI and self-report measurement approach scales

2.4 The ability versus self-report scales divide

CHAPTER 3: Emotional intelligence and sports performance **19**

3.1 Adapted model of role of EI in sports performance

3.2 Sports performance pressure and Attention theories

3.3 EI and sports performance in cricket

3.4 Drivers of sports performance matrix

3.5 EI as a predictor of cricket team sports performance longitudinal study

CHAPTER 4: Published empirical research EI journal article **31**

4.1 Emotional Intelligence Scores Predict Team Sports Performance in a National Cricket Competition

CHAPTER 5: The Development of EI **55**

5.1 EI Development debate

5.2 EI training program design and implementation guidelines

5.3 EI training program design – use of mixed model EI conceptualisation

5.4 EI training program design – use of ability model EI conceptualisation

5.5 EI development in sport

CHAPTER 6: Published empirical research EI journal article	59
6.1 Increasing Emotional Intelligence in Cricketers: An intervention study	
CHAPTER 7: Importance of the study	85
7.1 Previously unknown relationships established	
7.2 Duality model of sports performance developed	
7.3 EI training and development intervention program developed	
7.4 Demonstrated that EI profile scores of individual athletes can be increased through an EI intervention training and development program.	
7.5 Study findings add new knowledge to the literature	
CHAPTER 8: Quo Vadis emotional intelligence research in sports performance?	87
8.1 Addressing limitations of research papers presented in this thesis	
8.1.2 Limitations of first paper	
8.1.3 Limitations of second paper	
8.1.4 EI and Coaching	
REFERENCES	91

ACKNOWLEDGEMENTS

I wish to acknowledge and express my sincere appreciation to the following people during the preparation of this thesis.

Tim Noakes, to whom I am forever indebted for the privilege and benefit of his unfailing support as my supervisor, generosity of spirit, unbridled enthusiasm, and consummate research wisdom.

Carl Lombard, for providing his statistical expertise, input, and patient guidance to help me see the statistical “wood for the trees”.

Vincent Van der Bijl, for his enthusiasm for and commitment to my research, and assistance in gaining access to professional cricket in South Africa.

Gary Kirsten, for supporting my efforts to carry out EI research in the sport of cricket in South Africa.

Megan Lofthouse, for her admin wizardry, unfailing willingness to help, and welcoming smile.

DECLARATION

I, **David Thomas Crombie**, do hereby declare that this thesis is my own work except where otherwise indicated.

Neither the substance nor any part of this thesis has been submitted in the past, or is being, or is to be submitted for a degree in the university or any other university.

This thesis is presented in fulfilment of the requirements for the degree of PhD.

I hereby grant the University of Cape Town free license to reproduce this thesis in part or whole, for the purpose of research.

Signed: _____

Date: _____

University of Cape Town

LIST OF PUBLICATIONS

Crombie, D.T., Lombard, C. and Noakes, T.D., Emotional Intelligence Scores Predict Team Sports Performance in a National Cricket Competition, International Journal of Sports Science & Coaching, 2009, 4(2), 209-224.

Crombie, D.T., Lombard, C. and Noakes, T.D., Increasing Emotional Intelligence in Cricketers: An intervention study, International Journal of Sports Science & Coaching, 2011, 6(1) 69-86.

University of Cape Town

CONFERENCE PROCEEDINGS

International Sports Science Conference, Pudrajaya Malaysia, 19-20 December 2006.

Crombie, D.T., Lombard, C. and Noakes, T.D., Emotional Intelligence Scores Predict Team Sports Performance in a National Cricket Competition

4th World Congress on Sports Science and Medicine in Cricket. Chandigarh, India, 31 March-1 April 2011.

Crombie, D.T. and Noakes, T.D., Researching the Role of Emotional Intelligence in Cricket

University of Cape Town

LIST OF FIGURES

CHAPTER ONE

Figure 1.1: *Mental age/performance potential relationship*

Figure 1.2(a): *IQ/performance potential relationship*

Figure 1.2(b): *High IQ/high performance potential relationship*

Figure 1.2(c): *Low IQ/low performance potential relationship*

Figure 1.3: *Duality of IQ/ Non-cognitive intelligence performance potential*

Figure 1.4(a). *High IQ/high non-cognitive intelligence threshold congruence predicts high performance potential*

Figure 1.4(b). *High IQ/Low non-cognitive intelligence threshold congruence predicts Low performance potential*

Figure 1.4(c). *Low IQ/High non-cognitive intelligence threshold congruence predicts Low human performance*

Figure 1.5: *Cognitive (IQ)/Non-cognitive intelligence threshold congruence human performance potential matrix*

CHAPTER THREE

Figure 3.1: *Threshold congruence relationship of the Physical and Mental Game (EI) drivers of Sports Performance Potential*

Figure 3.2: *Physical Game in Cricket – Batting*

Figure 3.3: *Physical Game in Cricket - Bowling*

Figure 3.4: *Mental Game (EI) in Cricket – Effective Batting*

Figure 3.5: *Mental Game in Cricket – Effective Bowling*

Figure 3.6: *Mental Game in Cricket – Ineffective Batting*

Figure 3.7: *Mental Game in Cricket – Ineffective Bowling*

Figure 3.8: *Physical Game – Mental Game (EI) threshold congruence sports performance potential matrix*

CHAPTER FOUR

Figure 4.1: *Log points against EI Total score by season and pooled.*

Figure 4.2: *Log points against EI Perceiving and Identifying Emotions branch score by season.*

Figure 4.3: *Log points against EI Facilitation of Thought branch score by season.*

Figure 4.4: *Log points against EI Understanding Emotions branch score by season.*

Figure 4.5: *Log points against EI Managing Emotions branch score by season.*

CHAPTER SIX

Figure 6.1: *IQ/EI duality model of human performance potential.*

Figure 6.2: *Graphic Representation of MSCEIT Scores.*

Figure 6.3: *Graphic Representation of Study Design.*

Figure 6.4: *Scatterplot of Total EI Pre and Post scores by group by year.*

Figure 6.5: *Scatterplot of Perception Pre and Post scores by group by year.*

Figure 6.6: *Scatterplot of Facilitation Pre and Post scores by group by year.*

Figure 6.7: *Scatterplot of Understanding Pre and Post scores by group by year.*

Figure 6.8: *Scatterplot of Managing Pre and Post scores by group by year.*

LIST OF TABLES

CHAPTER FOUR

Table 4.1: Mean and standard deviation of Log Points and EI Total and branch sub scores per year.

Table 4.2: Spearman correlation coefficients of Log Points and EI Total and branch sub-scores.

Table 4.3: Estimated parameters of the final linear regression models for the Total and sub-scores.

CHAPTER SIX

Table 6.1: *Demographics for the players randomised to the 2 different arms of the study.*

Table 6.2: *2007/2008 Intervention group Pre and Post range of individual Total EI and Branch scores and number of individual score changes.*

Table 6.3: Mean EI Pre and Post scores and estimated intervention effect.

OUTLINE OF THESIS

INTRODUCTION

In the realm of sports performance it is self-evident that not all athletes or teams are made equal, and thus it is understandable that researchers concerned with the quest for high performance in sport would wish to identify empirically what differentiates high from low performance. While research into the relationship between emotions and sport performance is a well established field of study, the emergence of the construct emotional intelligence has opened up a new research focus and addition to the literature. However, despite the increasingly widespread view that emotional intelligence may be linked to sports performance, currently few empirical research studies have been undertaken, and thus there is a paucity of substantive scientific evidence to support this contention.

This reality was the point of departure for this thesis, with the aim of investigating the role of emotional intelligence (EI) in team sports performance. Given the centrality of the construct EI in this research line of enquiry, it was necessary at the outset to address both ontological and epistemological issues.

CONCEPTUALISATIONS AND DEFINITIONS OF EI

In terms of the nature of EI, essentially two conceptualisations have emerged, namely the initial “intelligence” version and the later “mixed” versions. The initial version is based upon a narrow scientific approach in which EI is defined strictly as a non-cognitive intelligence that determines the ability to exercise emotional control as defined by the four-branch ability model of EI. In contrast, the later popularised versions morphed and distorted the narrow scientific approach through the addition of, and emphasis on, other skills, characteristics, competencies, and mixed personality traits. It is manifestly evident that the difference between these two conceptualisations of EI is significant. In particular, the narrow scientific approach of the ability model amounts to a new non-cognitive intelligence strictly in the realm of emotion, whereas the emphasis of the mixed models on multiple and haphazard

aspects of personality render them essentially unrelated to the initial scientific construct EI, or even to emotion and intelligence.

The problematic implication for EI/sports performance research is that the extent to which such studies utilise the mixed model conceptualisation can be seen to compromise the fundamental status of the research from a strictly EI focus, to that of a predominantly non-EI competencies/personality trait focus.

In light of the above, the studies undertaken and presented in support of this thesis are informed by the initial narrow scientific conceptualisation and ability definition of EI. Specifically, two lines of related longitudinal empirical research studies were conceived and carried out: The first investigated a posited relationship between Team EI and team sports performance, and the second sought to establish if the EI profile scores of individual athletes could be increased as a result of an EI training and development intervention program.

In the first study the population of interest was professional teams in the sport of cricket. This sports discipline and level of analysis was chosen for the exceptional complexity and “performance under pressure” character of the game, and which, over and above the physical demands, can also be seen to demand a high level of mental game (EI) capacity in order for teams to achieve competitive advantage. This posited duality of physical/mental (EI) was presented in a Threshold Congruence model of sports performance. In addition, sample selection was directed towards teams competing in the longer, two innings format of the game, which can last up to four days, or five in the case of Test cricket. This format is considered by cricket purists to be the classic, and most challenging, against which teams and individual cricketers worldwide are measured in terms of standing in the annals of the game. The South African annual national SuperSport cricket competition is the country’s premier long format version, in which each of the six franchises (formerly provinces) takes part, and was selected for the purposes of this study.

However, an indication of the difficulties presented by this study can be seen from the fact that it took over six months of negotiations with the South African cricketing authorities (Cricket South Africa) to gain unequivocal support for the study and, in

particular, obtain permission for access to all the contracted professional players, including those in the national team, for the measurement of their EI. A central feature of the study design required that participation was entirely voluntary, and achieving this buy-in necessitated protracted countrywide presentations to, and negotiations with the management and coaches of each franchise, as well as their contracted professional players.

It is suggested that securing the national support and participation of professional cricket in South Africa was a major research achievement and, quite apart from being a pre-requisite to undertaking the research, stands as a unique strength of the thesis. Further, it is undoubtedly the case that attaining unequivocal support at the national level in any professional sporting discipline around the world will require considerable effort on the part of researchers and, if attained can be seen to be testimony to the merits of the proposed research.

The research design/methodology of the first study was to measure the EI of each team (IV) and correlate these scores against a measure of their sports performance in South Africa's national premier cricket competition, namely their final log points (DV) achieved. In order to resolve the epistemological issue of data collection in respect of EI measures, it was necessary to consider which measurement approach would be most appropriate.

DATA COLLECTION - MEASUREMENT OF EI

As previously noted, EI research founded upon the mixed model conceptualisation is at best problematic, and it is argued that this issue is exacerbated where it shapes a reliance on a self-report survey approach to the critical knowledge production task of data collection.

It is the case that self-report surveys are the most common form of data collection in the non-pure sciences, including sports psychology. However, reliance on such measurement instruments introduces the risk of the data collected being susceptible to common method biases, including social desirability, ambiguous wording, and scale length. This can lead to spurious covariance as a consequence of respondents

interpreting or answering questions differently from that intended by the researcher, with the result that the data is contaminated by measurement artefacts.

In relation to this thesis it can be seen that self-report driven EI measurement is inevitably at risk of common method biases that result in contamination of measurement data and influence conclusions that can be drawn. As a consequence of the serious problematic issues inherent in self-report measures, the studies carried out for this thesis adopted an ability approach to the measurement of EI, specifically utilising the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) ability test instrument.

In order to become knowledgeable as to the psychometric nature and use of this instrument, I attended, and successfully completed a two day MSCEIT Training (International Accreditation) course conducted by the South African psychometric test distributors JvR Consulting Psychologists. The scope of the course included having my EI measured using the MSCEIT, as well as detailed analysis, feedback and interpretation of my EI profile scores. There was also a formal written examination in which the pass mark was a minimum of 75%.

Completion of the first study generated significant findings supporting the hypothesis that EI predicts sports performance at the team level of cricket. However, it was felt that in order to have greater confidence in the results it would be advantageous to replicate the study, and this was done with a different cohort in the following year, thereby generating both comparative year-on-year data and pooled longitudinal findings. The resultant two year study was as follows:

LONGITUDINAL STUDY 1

Objectives: The purpose of this research study was to examine the role of emotional intelligence in team sports performance. Specifically, the relationship between team emotional intelligence (Team EI) and team sports performance (Log Points) was investigated in a South African national cricket competition over two consecutive seasons. **Method:** A prospective design was used in which Team EI was based on cricketers measured prior to the start of each competition using the

Mayer, Salovey & Caruso Emotional Intelligence Test (MSCEIT) ability test and averaged over all games for that season. This was correlated with a measure of team sports performance, namely the final log points standing for each team at the end of both competitions. **Results:** Year-on-year and pooled Team EI was positively associated with the sports performance of the cricket teams. Further, pooled Team EI explained 61% of the variation in the final log points acquired by the different teams during the competitions. **Conclusions:** This finding suggests that EI may contribute to and predict the success of teams participating in complex sports like cricket.

In the case of the second study, the population of interest was individual professional cricketers, and the research question as to whether EI profile scores of individual cricketers could be increased arose as a result of the findings from the earlier study. It seemed logical to conclude that if EI of individual cricketers could be increased then perforce the EI of their team and its competitive advantage would increase. Thus an experimental study was devised to examine if the EI profile scores of individual cricketers could be increased as a result of an EI training and development intervention program.

For the purposes of this study the sample of individual cricketers chosen comprised all the contracted professional players (n=24) identified as future stars and selected to attend the South African National Cricket Academy's High Performance Centre in Pretoria to receive advanced and specialised coaching. Notwithstanding that feedback had been provided to the franchises and individual players on the results of the first study, further negotiations were necessary in order to gain support for the second study and access to those attending the academy. Further, the logistics involved in carrying out this study necessitated extensive travel to, and time spent at the national academy.

The research design/methodology was to randomly allocate the players into an intervention experimental group (n=12) and non-intervention control group (n=12), with both groups having their baseline profile scores (Total EI and four branch scores) measured prior to the intervention, and again post intervention in order to establish the extent of change in the EI profile scores of each group.

The EI training and development program presented to the intervention group was founded upon experiential case studies, and involved ten three-hour sessions over a two week period using a facilitated workshop format. Two comprehensive cohesion case studies, one generic and one specifically cricket related, together with an EI analytical framework served as a unifying guide throughout the program to empower the participants to identify the role of the four branches of EI, both individually and collectively in shaping the performance outcomes of cases presented, ranging from low to high performance.

The experiential cases chosen were deliberately selected to include a comprehensive spectrum of EI cricketing performance under pressure situations, both on and off the field of play, as well as related experiences shared by participants during the workshops, all of which were explored through the lens of the analytical framework. In the case of the Control group no EI training and development program was administered. Upon completion of the program, post intervention EI measures of both groups were obtained.

The results of the second study showed significant findings supporting the hypothesis that the EI profile scores of individual cricketers could be increased as a result of an EI training and development intervention program. It was again felt that in order to have greater confidence in the results it would benefit the thesis to replicate the second study, and this was done with those players attending the academy in the following year.

The resultant two year study was as follows:

LONGITUDINAL STUDY 2

Objectives: The purpose of this study was to investigate the effect of emotional intelligence (EI) training and development on the EI profile scores of individual cricketers. **Methods:** 24 players attending the South African National Cricket Academy were randomised to an intervention group (EI training and development intervention program) or control group (no intervention). The experimental design was executed in 2007 and 2008 with different cohorts of players. The EI of the

players in both the intervention and control groups was measured before and after the intervention using the MSCEIT. **Results:** In 2007 the baseline Total EI score for the intervention group was 84.9 and the post intervention Total EI score was 96.6, giving a relative increase of 13.7%. By comparison, the baseline Total EI score for the control group was 81.8 and post intervention the Total EI score was 83.4, giving a relative increase of 2%. In 2008 the baseline Total EI score for the intervention group was 89.4 and the post intervention Total EI score was 101.7, giving a relative increase of 13.8%. By comparison, the baseline Total EI score for the control group was 87.4 and the post intervention Total EI score was 84.8, a relative decrease of 3.1%. The estimated intervention effect for the percentage change in Total EI score over both years is 14.5% (95% CI: 11.9 to 17.2%) and is significant. **Conclusions:** EI training and development may contribute to increasing the EI profile of individual cricketers. Since our first study showed that EI predicts performance in a complex team sport like cricket, an increase in EI scores as shown in our second study would be predicted to improve team performance.

SUMMARY

In considering the thesis as a whole, it was founded upon the successful outcome of protracted negotiations at the South African national and franchise wide level of professional cricket, and four years research endeavour in which two longitudinal empirical research studies were completed. The overriding aim to investigate the role of EI in sports performance was achieved, specifically in the domain of EI as a predictor of team performance in cricket, and increasing the EI of individual cricketers through an EI intervention program. The thesis reflects a number of unique and significant research outcomes that were achieved, including:

- Gaining support for the studies from the national cricket authorities, and obtaining voluntary buy-in from every franchise and contracted professional cricketer in South Africa can be seen as an exceptional research achievement, and without which the studies as proposed would not have been possible.
- To the best of our knowledge no such research examining the role of EI in sports performance at the team level in cricket, nor an EI intervention study of

individual cricketers, has previously been conducted. Thus the objectives of both studies were unique.

- The development of a Threshold Congruence Physical and Mental (EI) Game Model of the role of EI in sports performance and its application to the sport of cricket is unique and a strength of the thesis.
- Using the MSCEIT in the first study to measure the EI profile scores of every contracted professional cricketer in South Africa in order to determine the game-by-game Team EI of every franchise during each competition was unique, as was its use in the second study to measure baseline and post intervention EI profile scores of individual cricketers in both the experimental and control group.
- Development of an experiential case study based EI training and development intervention program specifically designed for the sport of cricket was a major strength of the second study.
- Scoring of the MSCEIT instrument completed by participants from both studies was carried out independently of the authors by the proprietary owners Multi Health Systems and this can be seen as a strength of the thesis.
- The decision to replicate both studies and generate year-on-year comparative and longitudinal research findings can also be seen to be a major strength of the thesis.
- Previously unknown EI and sports performance relationships were established and the research findings of both studies are significant and unique, thereby adding new knowledge to the literature.
- Lastly, original research papers reporting both longitudinal studies were published in a peer reviewed international journal:

Paper 1

Crombie, D.T., Lombard, C. and Noakes, T.D., Emotional Intelligence Scores Predict Team Sports Performance in a National Cricket Competition, International Journal of Sports Science & Coaching, 2009, 4(2), 209-224.

Paper 2

Crombie, D.T., Lombard, C. and Noakes, T.D., Increasing Emotional Intelligence in Cricketers: An intervention study, International Journal of Sports Science & Coaching, 2011, 6(1) 69-86.

University of Cape Town

CHAPTER 1: History of the construct emotional intelligence

1.1 Cognitive and non-cognitive intelligence

The historical roots of emotional intelligence (EI) are founded upon theoretical development and research on the role of cognitive and non-cognitive intelligence in human performance. However, prior to the development of the construct EI these fields were initially viewed as unrelated and were studied separately [1-3].

1.1.2 Cognitive intelligence conception of human performance

In the field of cognitive intelligence, the pioneering work of Binet and Simon [4] focused on the role of cognitive intelligence as a predictor of human performance. Their efforts resulted in the development of the first intelligence test which became known as the Binet - Simon scale. This novel test relied upon the concept of a mental age, in terms of which the test derived a measure of intelligence based on the average abilities of children of a certain age group in terms of attention, memory, and verbal skill. The test consisted of 30 items ranging from the ability to touch one's nose or ear, when asked, to the ability to draw designs from memory and to define abstract concepts, and varying in difficulty. Binet proposed that a child's intellectual ability increases with age and that served to predict their performance potential [4].

This posited Mental age/performance potential relationship is shown in Figure 1.1.

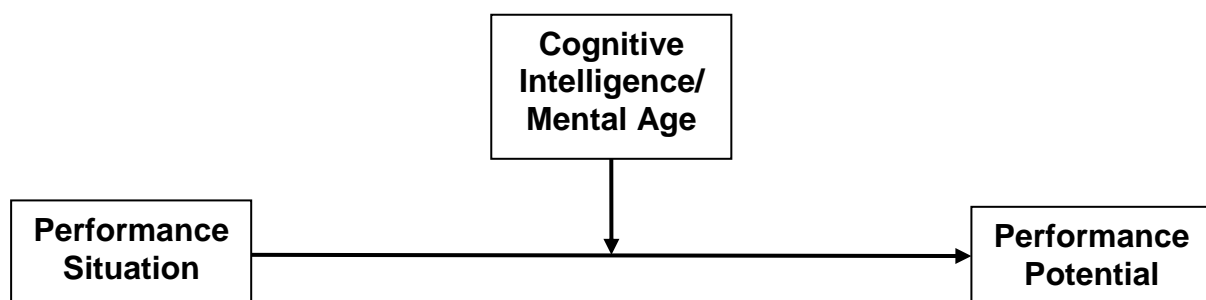


Figure 1.1: *Mental age/performance potential relationship.*

However, Binet drew attention to what he viewed as a limitation of the test, suggesting that intelligence was influenced by multiple factors, and thus was too broad a concept to be quantified by a single number [5]. The Binet - Simon scale

was subsequently adapted and revised by psychologist Lewis Terman of Stanford University. This version became known as the Stanford - Binet intelligence test, and was the first use of the intelligence quotient (IQ) [6].

The IQ test measured a subject's cognitive ability to perform intellectual operations such as form concepts, solve problems, and reason logically. The IQ score derived from the test was in the form of a single number that was intended to quantify intellectual functioning in order to allow comparison among individuals and to predict their performance potential. This score was calculated by dividing the test taker's mental age by their chronological age, and then multiplying this number by 100. For example, a child with a mental age of 12 and a chronological age of 10 would have an IQ of 120 ($12 / 10 \times 100$). Thus, in terms of this conception the higher the IQ the greater the performance potential [6]. This posited IQ/performance relationship is shown in Figures 1.2 (a, b & c).

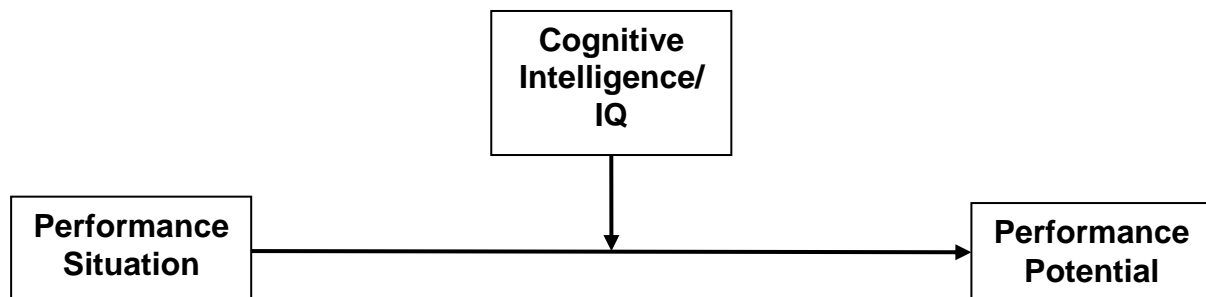


Figure 1.2(a): *IQ/performance potential relationship.*

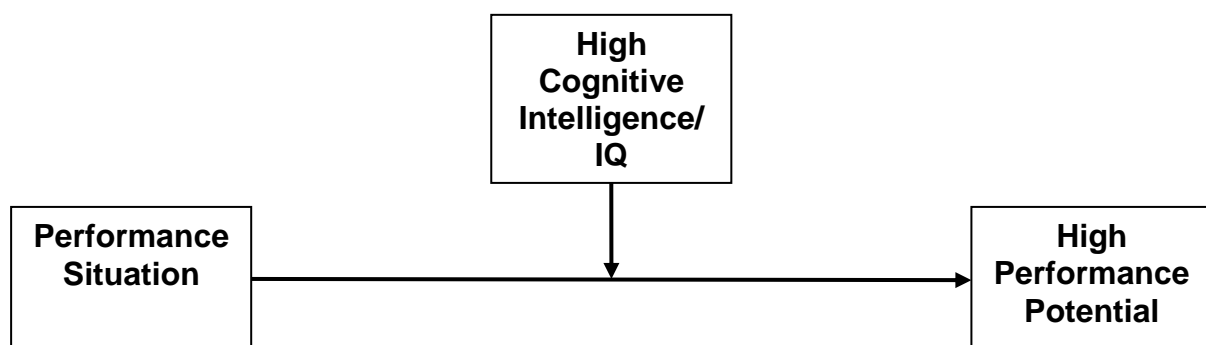


Figure 1.2(b): *High IQ/high performance potential relationship.*

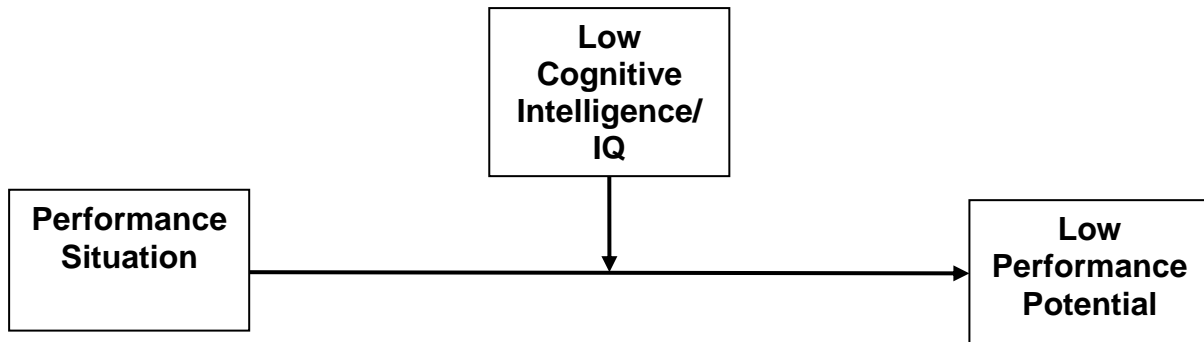


Figure 1.2(c): *Low IQ/low performance potential relationship.*

In Figure 1.2(a) IQ is shown as predicting an individual's performance potential. Figures 1.2(b) and 1.2(c) illustrate that the level of an individual's IQ is the differentiator of their performance potential.

Much like Binet, psychologist David Wechsler believed that intelligence involved a number of different mental abilities, and he created a new intelligence test known as the Wechsler Adult Intelligence Scale (WAIS) [7]. Rather than score the test based on chronological age and mental age, as was the case with the original Stanford - Binet test, the WAIS is scored by comparing the test taker's score to the scores of others in the same age group. The average score is fixed at 100, with two-thirds of scores lying in the normal range between 85 and 115. This scoring method has become the standard technique in intelligence testing and is also used in the modern revisions of both the WAIS and the Stanford - Binet test [8].

Cognitive intelligence testing essentially measures logical reasoning and analytical abilities; in effect, the skills that enable rational thought and action in problem solving situations. In terms of the claimed IQ/performance potential relationship an individual's IQ is viewed as the differentiator and predictor of their human performance at the level of cognitive ability [9]. However, the IQ perspective was criticised as too simplistic, in particular that the IQ/performance relationship does not always hold, as evidenced by those with a high IQ not being exempt from failure to perform, whereas others with a relatively low IQ were capable of high performance [9]. Thus, for an individual to succeed each specific performance situation can be seen to require a certain level of IQ. However, beyond a particular threshold higher

IQ levels appear not to be correlated with higher performance [10]. This issue was taken up by Jensen [11], who noted that:

Certain threshold regions on the IQ scale differentiate with high probability the potential for achieving success, but beyond these thresholds IQ becomes relatively unimportant in terms of ordinary occupational aspirations and criteria for success [11] p113.

This evidence suggests that whilst a threshold level of IQ is necessary for success, it is not sufficient, as the construct IQ failed to account for non-cognitive abilities that could be seen to play a role in determining human performance.

1.1.3 **Non-cognitive intelligence conception of human performance**

Early research and theoretical efforts focused on establishing non-cognitive aspects of intelligence include the work of Thorndike [12], who used the term social intelligence to describe the skill of understanding and managing other people. In a similar vein, Wechsler [7] argued that in addition to "intellective" there are "non-intellective" affective, personal, and social elements of intelligence, and viewed these as essential for predicting one's ability to succeed in life. Further, he stressed that total intelligence cannot be measured in the absence of measures of these non-intellective factors [13].

Adding to the debate, Gardner [3] expressed the view that traditional psychometric intelligence tests such as IQ fail to fully explain cognitive ability, and introduced the concept of multiple intelligences, which included interpersonal and intrapersonal intelligence [3]. According to Gardner, interpersonal intelligence is the ability to understand other people: what motivates them, how they work, and how to work cooperatively with them. Successful salespersons, politicians, teachers, clinicians, and religious leaders are all likely to be individuals with high degrees of interpersonal intelligence. In contrast, intrapersonal intelligence enables a capacity to form an accurate model of oneself and to be able to use that model to operate effectively [14].

The triarchic theory of intelligence proposed by Sternberg [15] also aimed to provide a more comprehensive description of intellectual capacity than the traditional differential or cognitive theories of human ability. The triarchic theory describes three fundamental aspects of intelligence: (i) Analytic intelligence comprises the mental processes through which intelligence is expressed; (ii) Creative intelligence is necessary when an individual is confronted with a challenge that is nearly, but not entirely, novel or when an individual is engaged in automatizing the performance of a task; (iii) Practical intelligence is bound in a sociocultural milieu and involves adaptation to, selection of, and shaping of the environment to maximize one's alignment in the context. The theory does not argue against the validity of cognitive intelligence (IQ); instead, it posits that it is part of analytic intelligence, but that only by considering all three aspects of intelligence can the full range of intellectual capacity and functioning be fully understood [15].

1.1.4 Duality of cognitive and non-cognitive intelligence conception of human performance

The research and theoretical quest on the part of advocates of non-cognitive intelligences opened up the possibility of a more holistic model of human performance founded upon a duality of cognitive and non-cognitive intelligences. This posited model is shown in Figure 1.3.

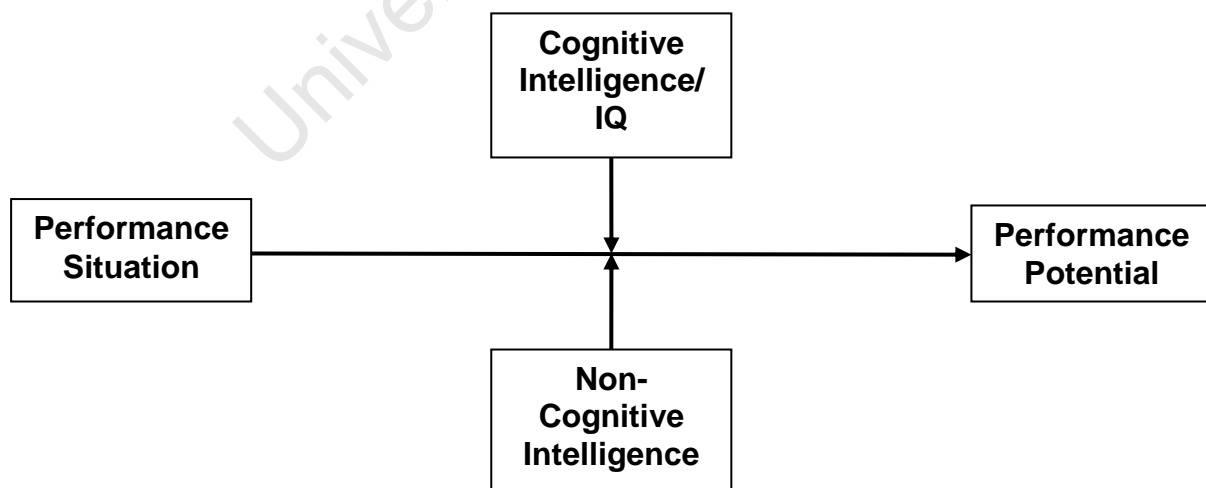


Figure 1.3: *Duality of IQ/ Non-cognitive intelligence performance potential.*

In terms of this model, human performance is conceptualised as being a function of both an individual's cognitive (IQ) and non-cognitive intelligence capacity [3,7,13,14]. However, rather than human performance being explained simply by the addition to IQ of non-cognitive intelligences and determined by the level of both, it is suggested from drawing on the threshold concept of performance discussed earlier [10,11] that performance will depend upon the extent to which their respective threshold level is congruent with the specific demands of a specific performance situation. Thus, as shown in Figure 1.4 (a, b and c) the greater/lesser the threshold congruence between the IQ and non-cognitive ability an individual provides relative to that required in any given situation, the greater/lesser their performance potential.

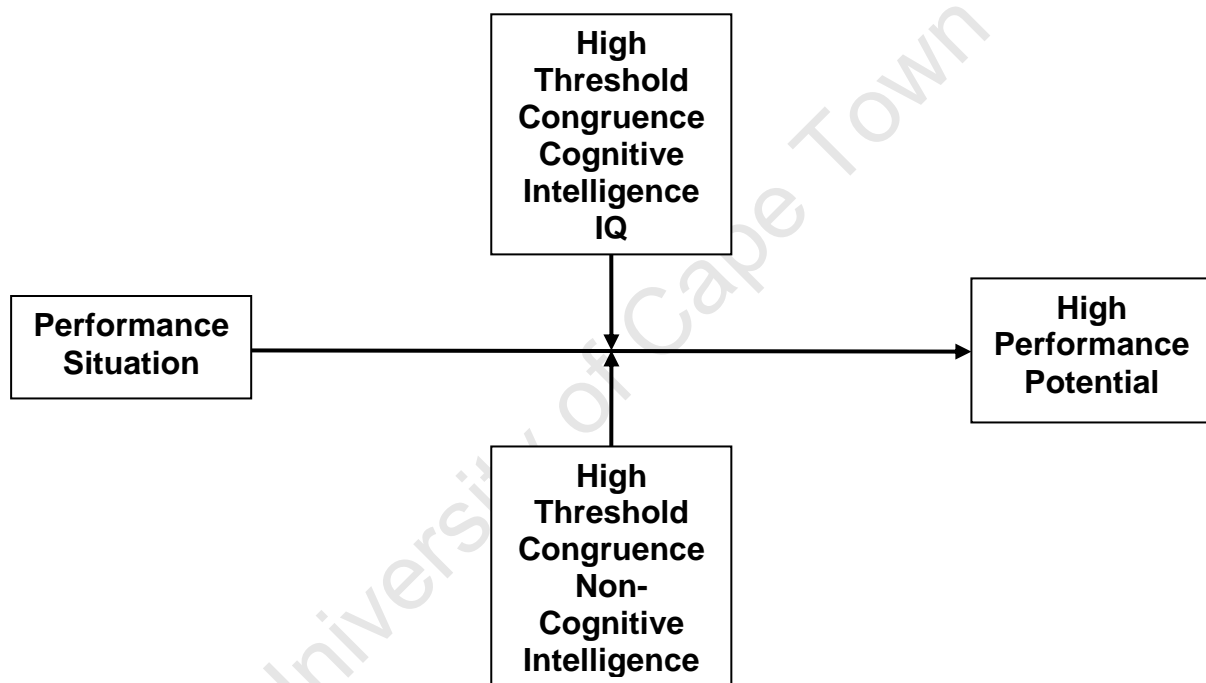


Figure 1.4(a). *High IQ/high non-cognitive intelligence threshold congruence predicts high performance potential.*

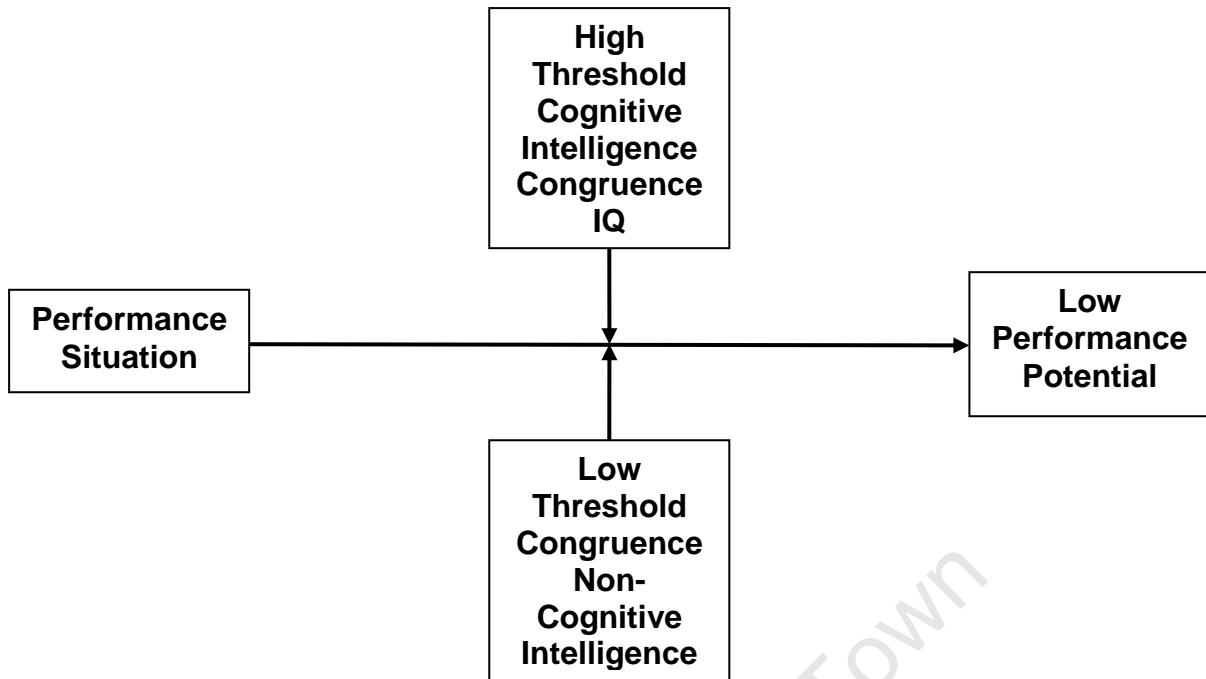


Figure 1.4(b). *High IQ/Low non-cognitive intelligence threshold congruence predicts Low performance potential.*

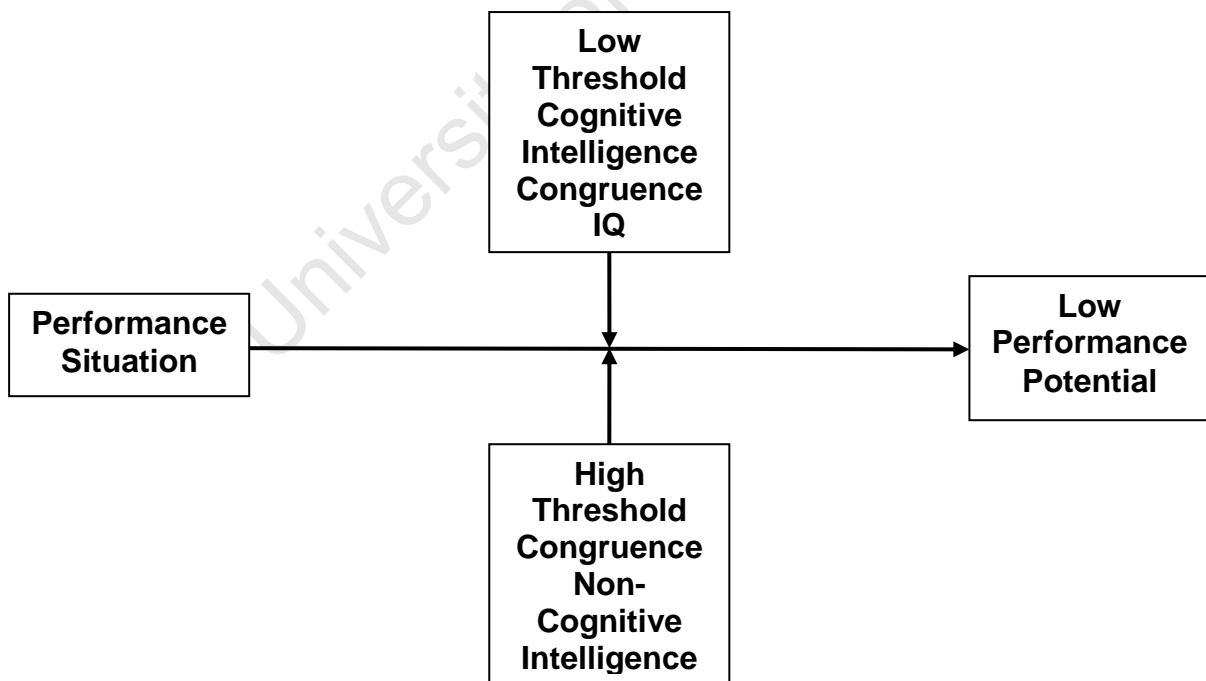


Figure 1.4(c). *Low IQ/High non-cognitive intelligence threshold congruence predicts Low human performance.*

It follows that in the quest for high performance a high threshold congruence of IQ alone is not enough as is reliance solely upon a high threshold of non-cognitive intelligence. The central point of the proposed threshold congruence perspective is that each situation will demand a requisite threshold congruence of both cognitive (IQ) and non-cognitive abilities in order to insure a high performance outcome. Thus, in terms of the proposed more holistic model shown in Figure 1.4(a), where the IQ and non-cognitive intelligence threshold of ability demanded in a given situation is met, it is suggested that the resultant duality of intelligence threshold congruence improves the probability of successful high performance outcomes. Importantly, this conceptualisation moves away from the much criticised uni-dimensional, fatally flawed cognitive intelligence (IQ) approach and addresses the need for situation specific threshold congruence of both IQ and non-cognitive intelligence as joint drivers of human performance. This posited IQ/Non-cognitive intelligence threshold congruence relationship is shown graphically as a matrix in Figure 1.5.

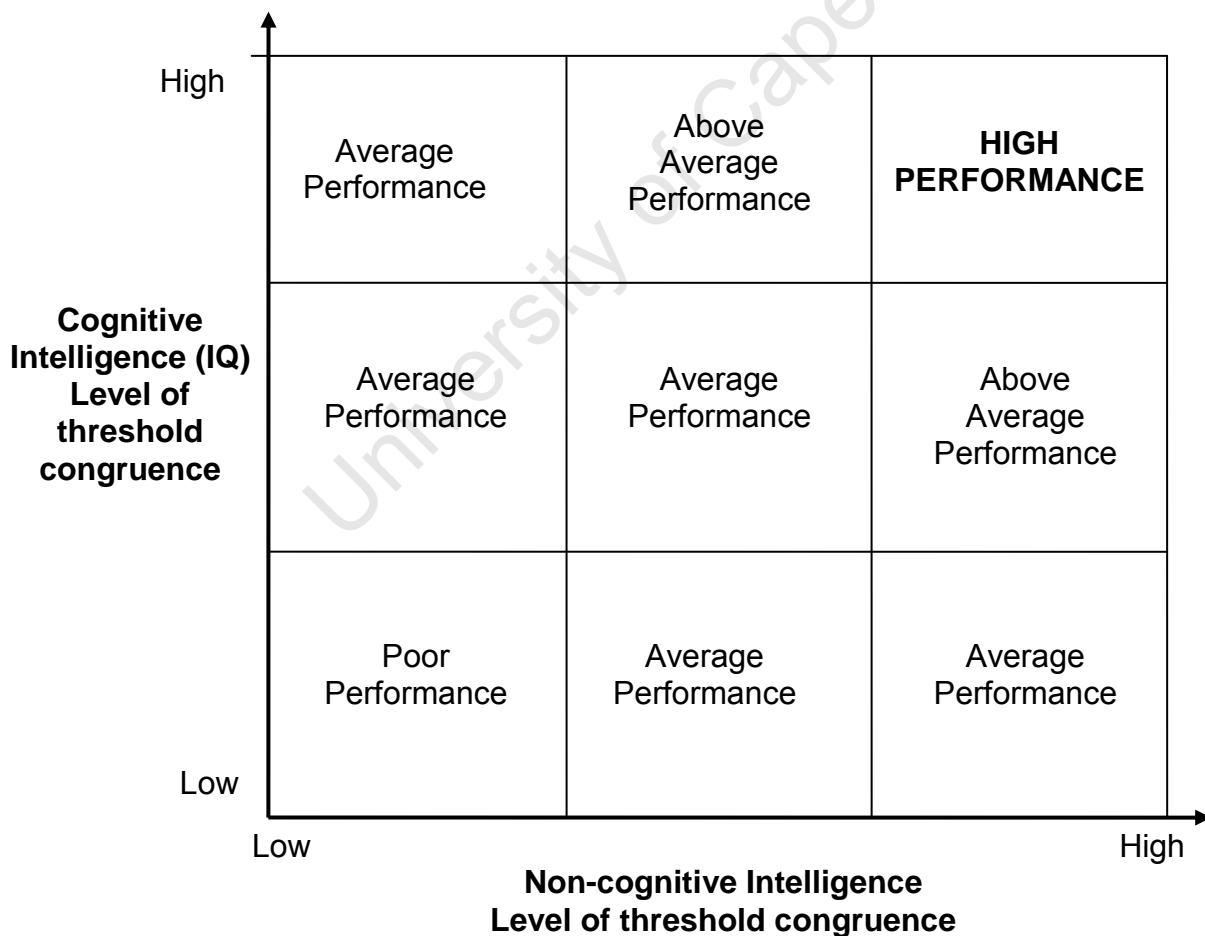


Figure 1.5: Cognitive (IQ)/Non-cognitive intelligence threshold congruence human performance potential matrix.

The matrix highlights the suggested relationship between the level of threshold congruence of the cognitive and non-cognitive intelligence performance drivers and the resultant level of achieved human performance.

1.1.5 Emotion and human performance

In tandem with the theoretical development work and research on cognitive and non-cognitive intelligences, early research efforts in the realm of emotion as it relates to human performance has focused on the origins of emotional responses. In this regard, the work of Darwin asserted that these were the result of heritability and evolution, whereas others have claimed that such responses are culturally determined [16].

The emotion human performance debate led to collaboration between the cognitive, non-cognitive intelligence and emotion research factions, and as a result the field of cognition and affect came into being, with a focus on the interaction between thoughts and emotions and how they jointly shape human performance [17]. This new emphasis saw the emergence of numerous precursors to the construct EI appearing on the intelligence research landscape. These included studies in the field of non-verbal communication which created scales aimed at measuring non-verbal information, including emotions in facial expression and body language [18]. Empirical studies on social intelligence indicated it was comprised of social and empathy skills, as well as emotionality [19]. Also, work in the area of artificial intelligence sought to establish if computers could identify, understand and reason about the emotional material contained in stories. By software modelling cognition of emotional tasks as a function of logic and list-processing procedures the relevance of this synthesizing intelligence line of research is its potential support for view that emotions and their cognition and be explained in terms of the cognitive intelligence conception of human performance [20].

1.1.6 The emergence of emotional intelligence as a discreet scientific construct and non-cognitive intelligence driver of human performance

The earliest scientific incarnation of the construct emotional intelligence, and its introduction as an empirical field of study, was the result of the pioneering work of Salovey and Mayer [21]. They forged their conceptualisation of the construct EI by

drawing on threads from both cognitive and non-cognitive intelligence research, as well as the field of emotion research and the emergent collaborative field of cognition and affect [21-24]. In so doing their guiding principle was a narrow and scientific view of emotional intelligence in terms of which it strictly comprised only a set of non-cognitive emotional abilities that capture the interplay of emotions and intelligence [21].

In line with their ability approach they initially defined EI as:

A form of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions [21] p.189.

This definition of the construct was later refined, and restated as:

Emotional intelligence refers to an ability to recognise the meanings of emotions and their relationships and to reason and problem-solve on the basis of them. Emotional intelligence is involved in the capacity to perceive emotions, assimilate emotion-related feelings, understand the information of those emotions, and manage them [25] p.267.

This theoretical conceptualisation and definition informed their resultant benchmark mental ability-based model of the construct EI, and divides EI into four branches. The first branch is the ability of perception and awareness of emotions in oneself and others. The second branch concerns the ability to use emotions to facilitate and enhance thought, including accurate association of emotions to other sensations. The third branch involves the ability to understand emotions, where they come from and how they progress from one emotion to another, such as anger to rage or pleased to elation. The fourth branch deals with the ability to manage emotions in oneself and others so as to achieve the effective behavioural response to different situations [26].

In the wake of the pioneering scientific work of Mayer et al [21], controversy in the field arose with the popularisation of EI as a result of substantial changes to the

original narrow scientific definition and ability model conceptualisation. Goleman [27], for example, used a much broader definition of EI in his proposed model and included areas that emphasised a shift towards EI as competencies of motivation and social relationships, with the ability to understand and process emotions being mixed with desirable personality characteristics. Similarly, in the work of Bar-On [28] an expanded model was presented based upon defining EI as:

An array of non-cognitive capabilities, competencies, and skills that influence one's ability to succeed in coping with environmental demands and pressures [28] p.14.

The significant definition and elaboration changes found in the popularised versions of EI ushered in the emergence of what became known as a mixed model of emotional intelligence [27-29]. Although some commentators have suggested that the different conceptualisations and definitions of the construct are more complimentary rather than contradictory [22], opposing and seemingly irreconcilable views persist [29,30]. Thus the contemporary and controversial history with regard to the nature of emotional intelligence has seen essentially two conceptualisations emerge. There is the original, scientific and narrowly focused approach that informs the ability model, and the popularised much broader personality approach of the mixed model [31].

The relevance to this thesis of this conceptualisation dualism relates to the critical importance of ensuring that EI/sports performance research is informed by a strictly EI focus. In this regard, it is argued that the extent to which such studies utilise the mixed model conceptualisation can be seen to result in a problematic and predominantly non-EI competencies/personality trait focus which compromises the fundamental EI status of the research.

In light of the above, the studies undertaken and presented in support of this thesis are informed by the initial narrow scientific conceptualisation and ability definition of EI, thereby ensuring a strict research focus upon EI as a non-cognitive intelligence, and its role in sports performance.

Specifically, two lines of related longitudinal original empirical research studies were conceived and carried out. The first comprised a two year investigation to examine a posited relationship between Team EI and team sports performance. The second, drawing on the findings from the first study, also comprised a two year investigation that sought to establish if the EI profile scores of individual athletes could be increased as a result of an EI training and development intervention program.

University of Cape Town

CHAPTER 2: Measurement of EI

2.1 Scales based upon definitions of EI and measurement approach

Alongside the ability versus mixed model debate as to the nature of EI, attempts to resolve the issue of how the construct could be measured have resulted in the emergence of scales that are differentiated in terms of their underlying definition or model of EI, and the approach used to measure the construct.

2.2 Ability model narrow definition of EI and ability measurement approach scales

The MSCEIT (Mayer, Salovey & Caruso Emotional Intelligence Test) [32] was a new scale developed to assess the Mayer et al [21,29] four branch ability model of EI. Informed by a theory of EI as an intelligence, the MSCEIT is based on the ability model's narrow scientific definition of the construct. The scale consists of a series of emotion-based problem solving test items for which there are correct answers, an ability test approach that adheres to the traditional way in which intelligence (IQ) is measured. A correct response on the ability test can be scored on the basis of agreement with a panel of experts or with general consensus, with ratings according to the two scoring systems correlating highly ($r > .90$) [25]. In addition, the MSCEIT includes positive-negative bias test items that are phrased both positively and negatively to minimise extreme response bias and acquiescence bias, and devise a total score which indicates the individual's tendency to respond to the ability test items by assigning positive relative to negative emotions. A score > 115 indicates a more than typical tendency to assign positive emotions, and a score < 85 indicates a more than typical tendency to assign negative emotions [32].

The four branches of the MSCEIT are divided into two different areas of EI: Experiential and Strategic. The experiential area comprises the Perception and Facilitation of emotion branches, which involves the identification of emotion and its productive use in thought. This area of EI is considered to index the more basic-level processing of emotion. The strategic area comprises the Understanding and Managing branches, which involve reasoning about emotions and how they may be managed. This is considered to be an index of the more higher-level, conscious processing of emotions. The MSCEIT provides an individual Total EI score, which

comprises the composite experiential and strategic area scores, as well as an individual score for each of four separate branches of EI as defined by the ability model [32].

Experiential Area of EI – Conscious identification of emotion and its effective use in thought:

- **Perceiving and Identifying Emotions** – the ability to recognize how an individual and those around him/her are feeling.
- **Facilitation of Emotions** – refers to the ability to generate emotion, and then productively reason with this emotion in terms empathy and aiding judgement about perceived emotions.

Strategic Area of EI - refers to the conscious ability to reason about emotions and effectively manage them:

- **Understanding Emotions** – the ability to understand complex emotions and the principles that govern how emotions change.
- **Managing Emotions** – the ability that allows an individual to manage his/her emotions and those of others.

2.3 Mixed model broad definition of EI and self-report measurement approach scales

Scales were also introduced that reflected the popularisation and resultant mixed models of EI. Given the broad definitions used, this led to adapted and new versions not informed by a theory of intelligence but based upon pre-existing personality tests that measured positive attributes correlated to high human performance potential [27,28,33,34].

The EQi (Emotional Quotient Inventory) scale [28], for example, was intended to assess the Bar-On mixed model of EI, and its formulation rested upon an earlier

scale originally designed as a measure of psychological well-being [28,33]. In terms of measurement approach, the EQ-i is a self-report instrument using items designed to measure a number of constructs related to EI. It gives an overall EQ score as well as scores for the following five composite scales and 15 subscale competencies [28,35].

Intrapersonal - refers to self-awareness and self-expression, and comprises five sub-scales:

- **Self-Regard:** To accurately perceive, understand and accept oneself.
- **Emotional Self-Awareness:** To be aware of and understand one's emotions.
- **Assertiveness:** To constructively express and assert one's emotions and oneself in through use of effective communication.
- **Independence:** To be self-reliant and free of emotional dependency on others.
- **Self-Actualization:** To strive to achieve personal goals and actualize one's potential.

Interpersonal - refers to social awareness and interpersonal relationship, and comprises three sub-scales:

- **Empathy:** To be aware of and understand how others feel.
- **Social Responsibility:** To identify with one's social group and cooperate with others.
- **Interpersonal Relationship:** To establish mutually satisfying relationships and relate well with others.

Stress Management - refers to emotional management and regulation, and comprises two sub-scales:

- **Stress Tolerance:** To effectively and constructively manage emotions.
- **Impulse Control:** To effectively and constructively control emotions.

Adaptability - refers to change management, and comprises three sub-scales:

- **Reality-Testing:** To objectively validate one's feelings and thinking with external reality.
- **Flexibility:** To adapt and adjust one's feelings and thinking to new situations.
- **Problem-Solving:** To effectively solve problems of a personal and interpersonal nature.

General Mood - refers to self-motivation, and comprises two sub-scales:

- **Optimism:** To be positive and look at the brighter side of life.
- **Happiness:** To feel content with oneself, others and life in general.

Similarly, the ECI (Emotional Competencies Inventory) scale [36] was based upon an existing scale that modelled and assessed a range of competencies in order to measure the effectiveness of managers [34]. In terms of measurement approach, the ECI is a 360-degree self-report instrument and generates a total individual EI score as well as scores for four composite scales and 18 sub-scale competencies [36]:

Self-Awareness - concerns knowing one's internal states, preferences, resources, and intuitions, and comprises three sub-scales:

- **Emotional Awareness:** Recognizing one's emotions and their effects.
- **Accurate Self-Assessment:** Knowing one's strengths and limits.
- **Self-Confidence:** A strong sense of one's self-worth and capabilities.
-

Self-Management - refers to managing ones' internal states, impulses, and resources, and comprises six sub-scales:

- **Emotional Self-Control:** Keeping disruptive emotions and impulses in check.
- **Transparency:** Maintaining integrity, acting congruently with one's values.
- **Adaptability:** Flexibility in handling change.
- **Achievement:** Striving to improve or meeting a standard of excellence.
- **Initiative:** Readiness to act on opportunities.
- **Optimism:** Persistence in pursuing goals despite obstacles and setbacks.

Social Awareness - refers to how people handle relationships and awareness of others' feelings, needs, and concerns. The Social Awareness cluster contains three competencies:

- **Empathy:** Sensing others' feelings and perspectives, and taking an active interest in their concerns.
- **Organizational Awareness:** Reading shifts in a group's mood state and power relationships.
- **Service Orientation:** Anticipating, recognizing, and meeting customers' needs.

Relationship Management - concerns the skill or adeptness at inducing desirable responses in others. The Relationship Management cluster contains six competencies:

- **Developing Others:** Sensing others' development needs and bolstering their abilities.
- **Inspirational Leadership:** Inspiring and guiding individuals and groups.
- **Change Catalyst:** Initiating or managing change.
- **Influence:** Wielding effective tactics for persuasion.
- **Conflict Management:** Negotiating and resolving disagreements.
- **Teamwork & Collaboration:** Working with others toward shared goals.
Creating group synergy in pursuing collective goals.

Examples of new scales developed and informed by mixed model broad definitions of EI include the EQ Map [37] and the SSEIT (Schutte Self-Report Emotional Intelligence Test) [38].

2.4 The ability versus self-report scales divide

The EI measurement divide is characterised by ability (e.g. MSCEIT [32]) versus self-report approaches, (e.g. EQ-I & ECI [27,28,36]). Given their differing psychometric properties some commentators have expressed the view that these different scales do not measure the same construct [39].

In the case of self-report scales, critics have argued against their discriminant validity on the basis that the overlap with traditional personality traits is so high that they

measure nothing new relative to existing personality scales. In addition, the issue of response bias due to socially desirability pressures has raised questions regarding the veracity of respondent's self-reported answers [40-42].

In contrast, it has been argued that ability scales obviate the validity and response bias issues associated with self-report scales and are thus a far more accurate measure of EI in capturing the constructs distinct emotional abilities [40,43].

However, both the ability and self-report approaches are currently used to measure EI and this adds further controversy and confusion to the debate surrounding the construct [43], and presents an impediment to progressing scientific research in the field [44-46].

The relevance to this thesis of the competing scales relates to need to ensure that what is intended to be measured, namely EI, is in fact what is measured as opposed to non-EI factors such as personality traits, or the generation of spurious covariance as a result of common method biases that contaminates the data and influences conclusions that can be drawn. As a consequence of the serious problematic issues inherent in self-report measures, the studies carried out for this thesis adopted an ability approach to the measurement of EI, specifically utilising the MSCEIT ability test instrument.

CHAPTER 3: Emotional Intelligence and Sports Performance

3.1 Adapted model of role of EI in sports performance

In the posited IQ/EI threshold congruence model presented in Chapter One, the role of EI is conceptualised as a non-cognitive driver of human performance. It is suggested that this model can be adapted to demonstrate the role of EI in sports performance. In terms of this proposed adapted model the principle drivers of sports performance potential comprise firstly an individual athlete's or team's physical game, and secondly their mental game (EI). This model is illustrated in Figure 3.1.

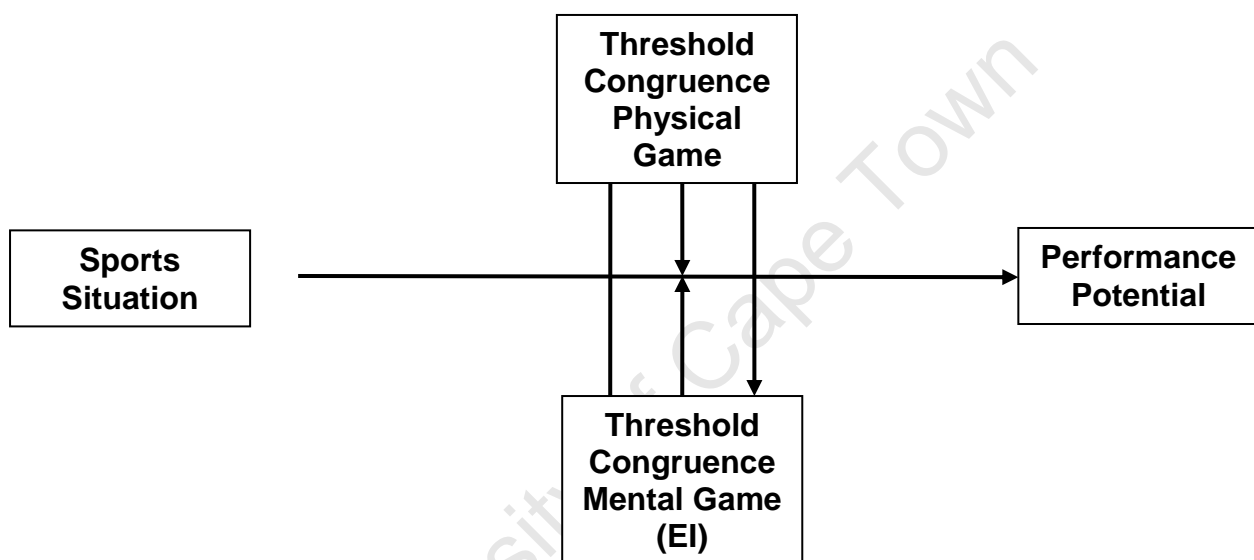


Figure 3.1: *Threshold congruence relationship of the Physical and Mental Game (EI) drivers of Performance Potential.*

In addition, as shown in Figure 3.1 the model indicates that the two drivers of sports performance potential are interactive. Thus, for example, where an athlete's mental game (EI) capacity achieves high threshold congruence the resultant level of emotional control will assist in coping with sports performance pressure, not only in terms of coping with emotions, but also in supporting the execution of the sports specific physical tasks. Conversely, a high level of threshold congruence at the level of the physical game will assist in the effective execution of sports specific tasks, and this in turn will support the mental game (EI) needed for emotional control.

3.2 Sports performance pressure and Attention theories

Drawing on the game of cricket, which can be seen to exemplify a complex sporting discipline played around the world and characterised by performance under pressure situations at both the individual athlete and team level, the proposed model suggests that an individual cricketer or cricket team's sports performance potential will be dependent upon the congruence of their physical and mental game (EI) threshold capacity relative to the demands of the specific cricket situation. In principle, the greater a cricketer or cricket team's threshold congruence of these two drivers the better able will they be to meet the sports performance demands of any given cricket situation. Considering specifically the model's conceptualisation of the role of the mental game (EI) in sports performance, the potential of "choking under pressure" and shifts in attention, as outlined in attention theories, highlights the critical need for athletes to achieve emotional control.

The attention theory of Explicit Monitoring suggests that performance anxiety under pressure leads to shifts in attention away from carrying out the actual task and inwards to "thinking too much in the moment" about how it should be performed. Such inward shifts in attention undermine learned execution skills, and compromise desired sport performance. The Distraction version, on the other hand, claims that under pressure athletes suffer equally problematic shifts in their attention to outside, away from the learned task at hand and onto external and unrelated cues and stimuli, such as the negative consequences of failing to perform. The effect of such distractions amounts to dual attention demands that potentially exceed the individual athlete's working memory and lead to performance of the original task being compromised [47-51].

Thus, shifts in attention away from the physical task at hand, either overly inward on how to perform the task, or outwards on negative external concerns are potentially self-defeating behavioural responses to the emotional challenge of task execution under pressure that lead to underperformance [47]. That such behaviours occur are explicable, according to Epstein [52], in terms of an individual's negative interpretation of an event triggering a destructive rather than constructive thought sequence and chain of reactions, with negative emotions and lack of emotional

control playing a role in compromising an athlete's behavioural response and task performance [52].

As has been suggested, the team game of cricket exemplifies "performance pressure" in sport, and the need for high threshold congruence of both the physical and mental (EI) games. Opening batsmen, for example, face high performance pressure as they seek to dominate the strike bowlers and establish a substantial partnership and high run rate to lay a competitive foundation for the innings. Equally, strike bowlers face high performance pressure as they attempt to secure an early breakthrough by taking wickets with the new ball, keep the run rate low and preventing high scoring partnerships. Where opening and top order batsmen are able to dominate the bowling attack and pile on the runs, the pressure on them eases, along with the mental game (EI) demands. By contrast, failure of the bowling attack to achieve the desired breakthrough and as the run rate increases the pressure on them, this leads to a concomitant increase in the need for emotional control as they continue to bleed runs and the batting partnerships grow. An early breakthrough and collapse of the top order batsmen, on the other hand would lessen the performance pressure and emotional control demands on the front line bowling attack, and the batting performance pressure and emotional control demands on the middle order to rescue the innings would increase, affecting all the lower order batsmen.

3.3 EI and sports performance in cricket

As the proposed adapted model indicates, for cricketers to succeed they must have the requisite threshold congruence of the physical and mental game (EI) in order to cope with the situation demands as an innings unfolds. To further illustrate the model, examples of the physical and mental (EI) game in the team sport of cricket at the level of batting and bowling are outlined in Figures 3.2-7.

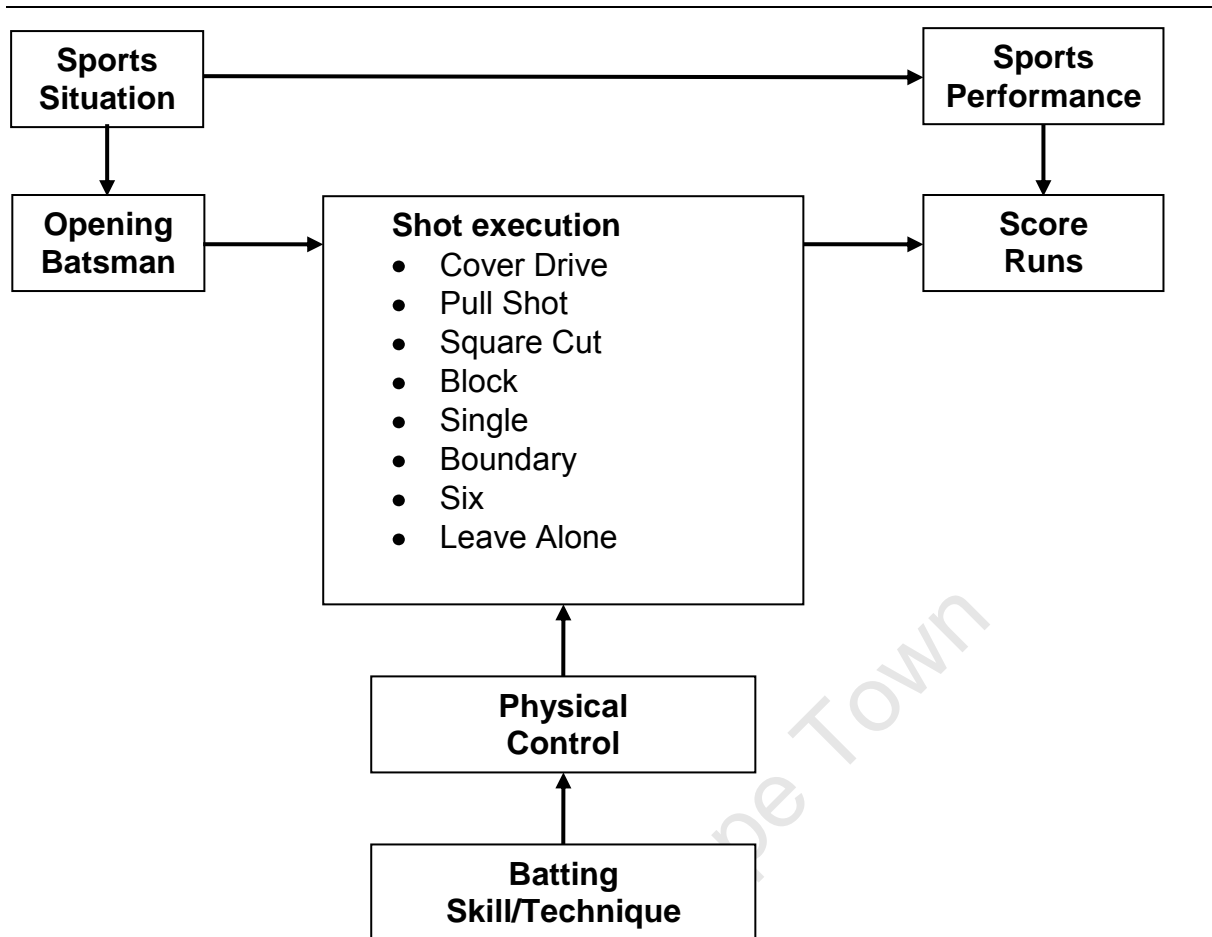


Figure 3.2: *Physical Game in Cricket – Batting.*

As shown above, for an opening batsman to achieve the performance objective of scoring runs, the physical game capacity needed will include the ability, for example, to make effective execution of a selected shot. This ability will be dependent upon a batsman having the requisite threshold level of physical control based upon his batting skills and techniques.

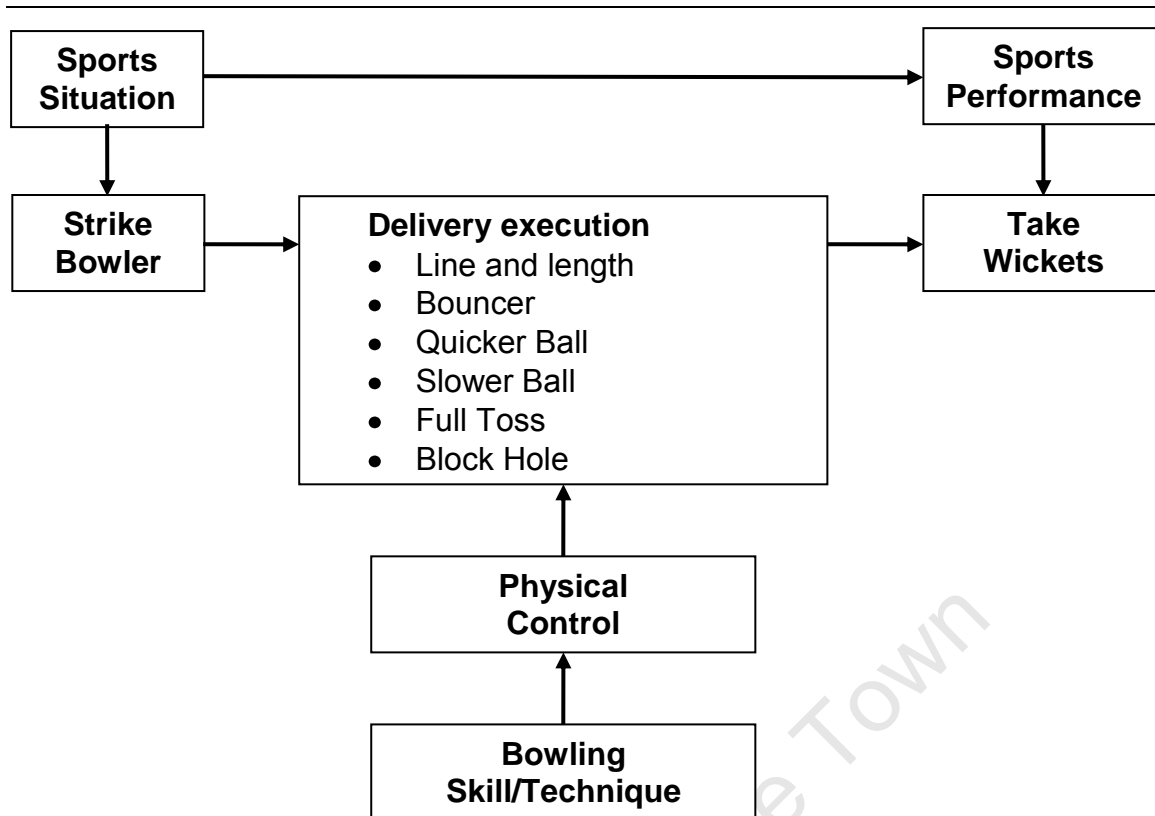


Figure 3.3: *Physical Game in Cricket – Bowling.*

Similarly, for a strike bowler to take wickets the ability to execute a selected delivery will be needed, and this will be contingent upon a requisite threshold of physical control based upon his bowling skills and techniques.

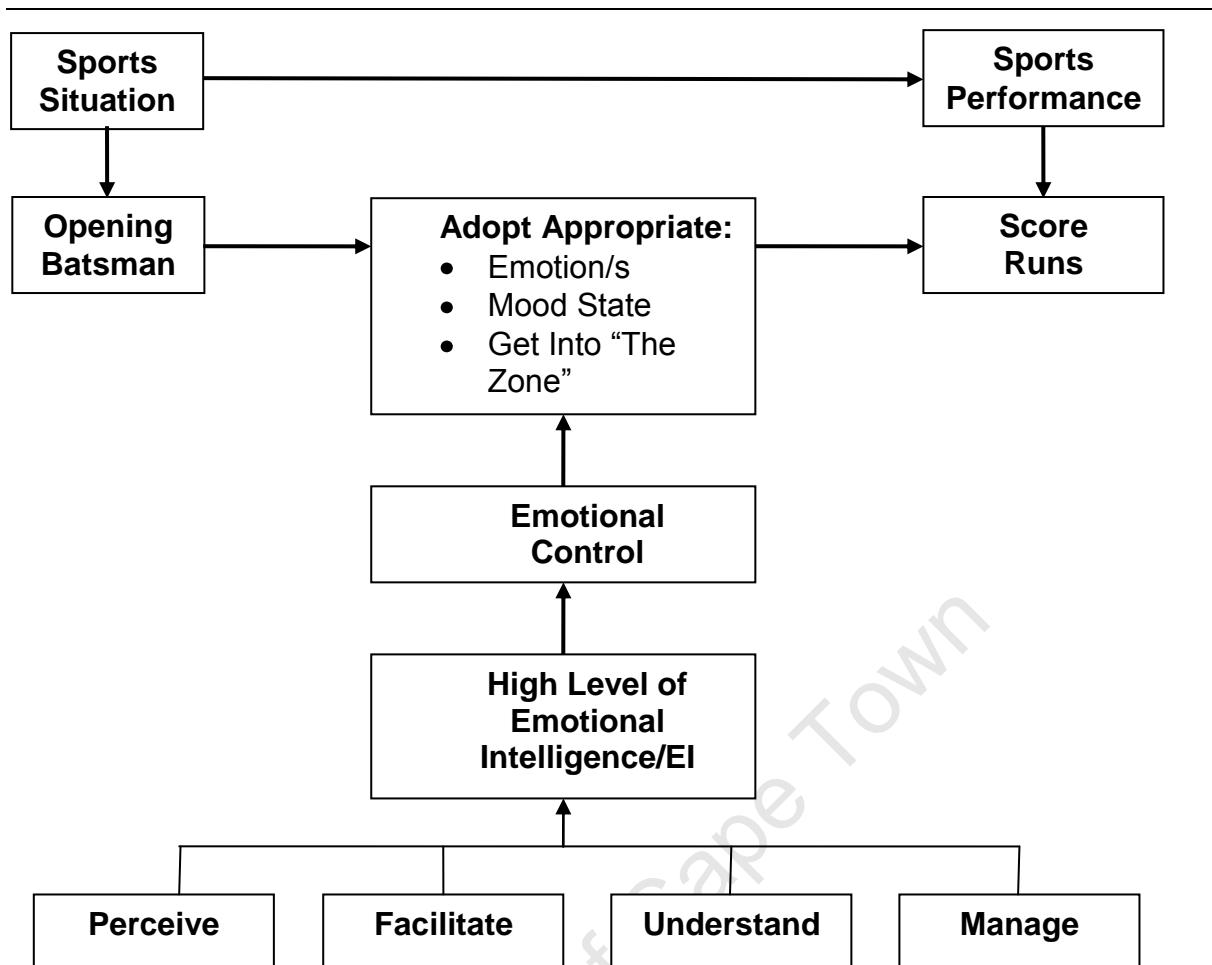


Figure 3.4: *Mental Game (EI) in Cricket – Effective Batting.*

In addition to the physical control needed by an opening batsman, the model suggests that in terms of the mental game (EI) there must also be a congruent threshold level of emotional control in order to adopt an appropriate emotional and mood state so that each ball can be played on its merits. Thus the level of emotional control needed to support effective batting can be seen to be strongly influenced, even dependent upon a player's mental game (EI) capacity.

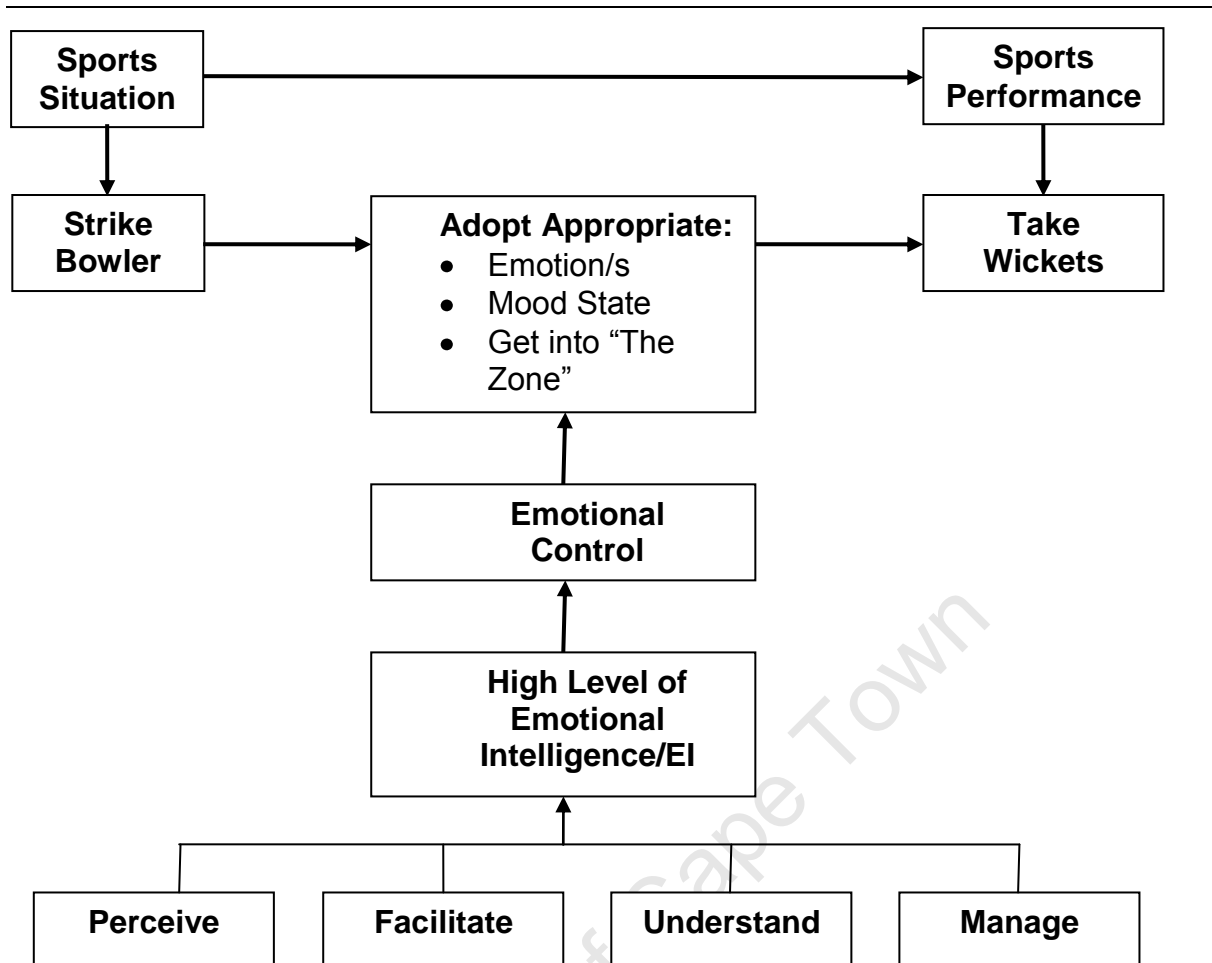


Figure 3.5: *Mental Game in Cricket – Effective Bowling.*

Just as in the case for an opening batsman, for a strike bowler to be effective a congruent level of emotional control will be needed, and this will be dependent upon an appropriate level of mental game (EI) capacity.

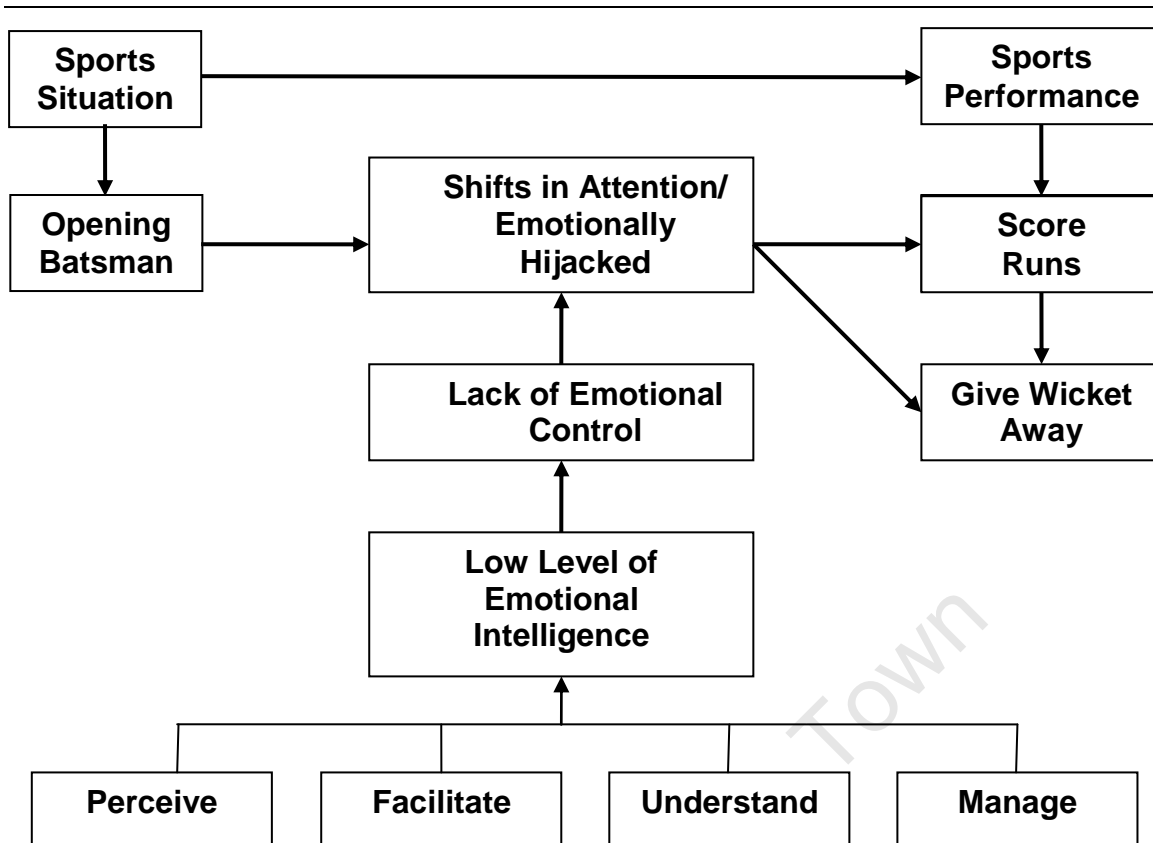


Figure 3.6: *Mental Game in Cricket – Ineffective Batting.*

Where a batsman is found wanting in terms of not having an adequate threshold level of emotional control, the risk of falling prey to shifts in attention and/or being emotionally hijacked can result in a failure to score runs, and potentially lead to poor choices and actions that will cause the batsman to be dismissed.

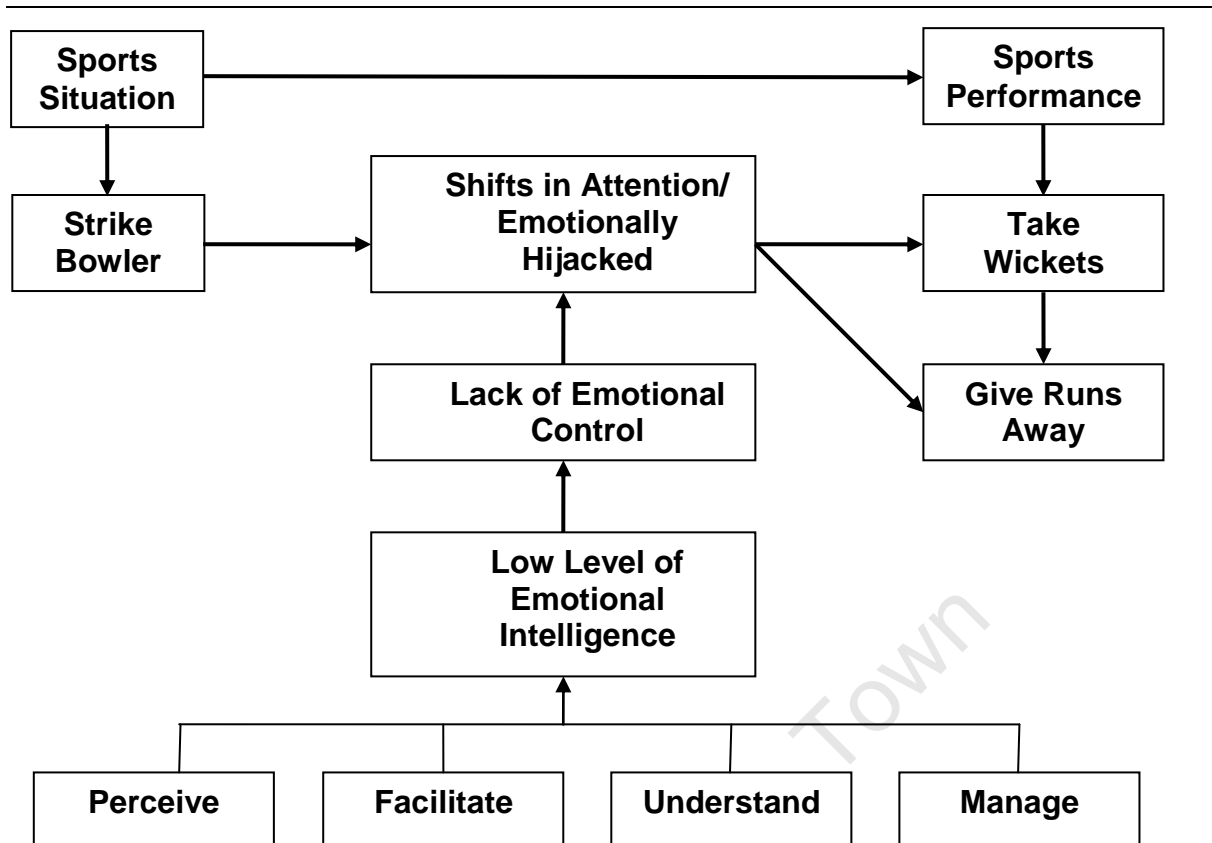


Figure 3.7: *Mental Game in Cricket – Ineffective Bowling.*

Equally, strike bowlers will also be at risk of failing to take wickets if they succumb to shifts in attention and/or are emotionally hijacked and bleed runs as a result of a lack of an adequate threshold level of emotional control, and are dominated by the batsmen.

3.4 Drivers of sports performance matrix

The posited physical game/mental game (EI) sports performance relationship is illustrated as a matrix in Figure 3.8.

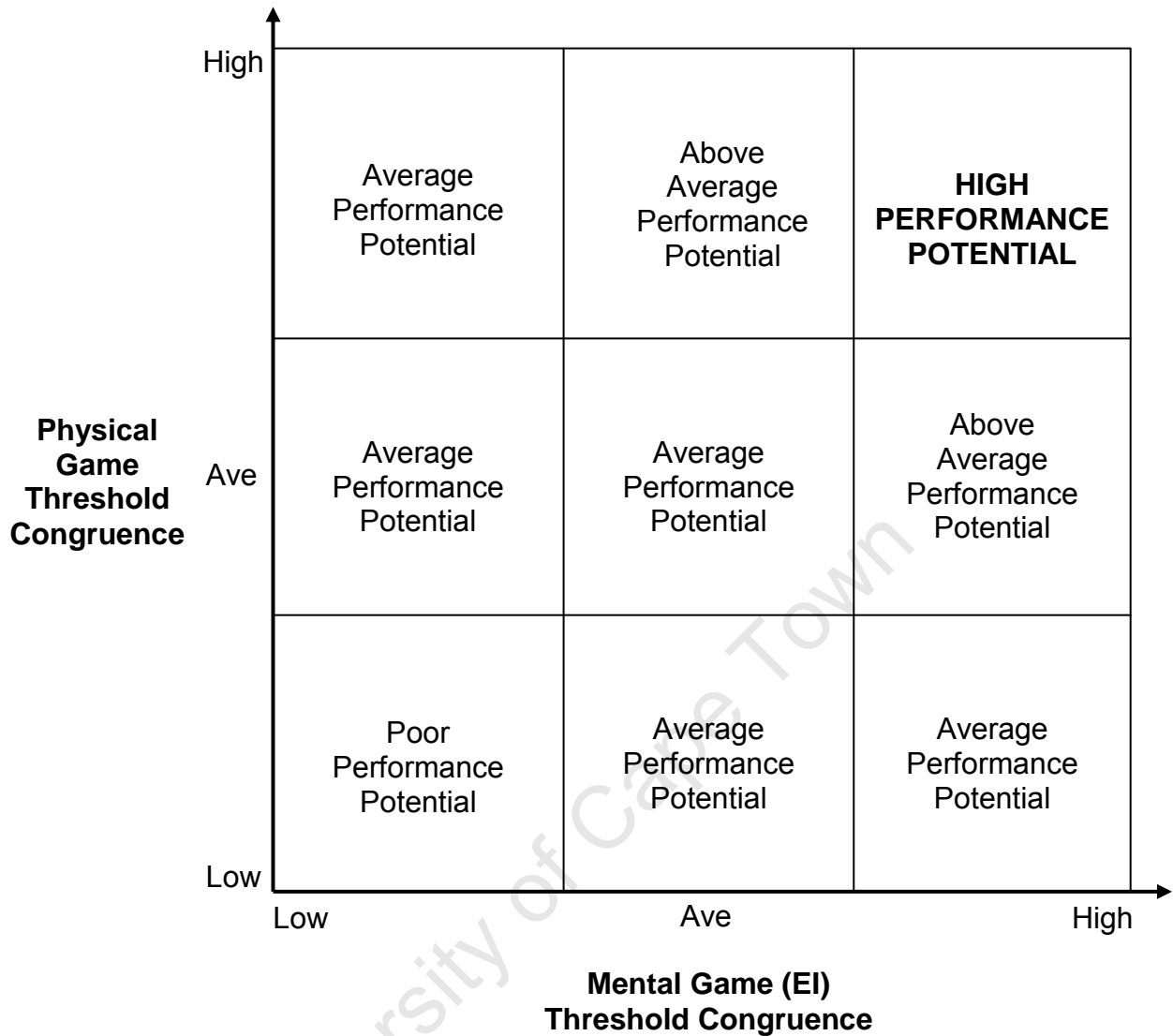


Figure 3.8: *Physical Game – Mental Game (EI) threshold congruence sports performance potential matrix.*

The matrix highlights the suggested relationship between the level of threshold congruence of the physical and mental performance drivers and the resultant level of sports performance potential.

3.5 EI as a predictor of cricket team sports performance

The hypothesis implicit in the proposed adapted threshold congruence model is that the EI of a cricket team will predict their sports performance. To test this hypothesis a prospective two year longitudinal research study was carried out, and the results showed a significant positive correlation between the EI of a cricket team and their

sports performance in a national cricket competition. The study was published in the International Journal of Sports Science & Coaching [53] and is presented in Chapter 4.

CHAPTER 4: Published original empirical research EI journal article

4.1 The following material was published:

Crombie, D.T., Lombard, C. and Noakes, T.D., Emotional Intelligence Scores Predict Team Sports Performance in a National Cricket Competition, International Journal of Sports Science & Coaching, 2009, 4(2), 209-224.

ABSTRACT

Despite an increasingly emergent and vociferous view espoused by sports psychology researchers and practitioners that emotional intelligence may be linked to sports performance, currently few research studies have been undertaken, and thus there is a paucity of empirical evidence to support this contention. In an effort to explore this proposed and potentially important linkage, the purpose of this research study was to examine the role of emotional intelligence in team sports performance. Specifically, the relationship between team emotional intelligence (Team EI) of six cricket teams and their sports performance in a South African national cricket competition over two consecutive seasons was investigated. Team EI was based on cricketers measured prior to the start of the competition in each season using the MSCEIT ability test and averaged over all games for that season. This was correlated with a team sports performance measure, the final log points standing for the team at the end of a competition. The results showed that team EI was positively associated with the sports performance of the cricket teams. Further, Team EI was shown to be a significant predictor of sports performance, with 61% of the variation in the log points explained. This finding suggests that EI may contribute to the success of teams participating in complex sports like cricket.

Key words: Emotional intelligence, emotional control, emotions, cricket, sports performance

INTRODUCTION

That sports performance attracts such widespread research interest is hardly surprising, for as noted by Starkes & Ericsson [54]:

Few human endeavours exist to which people dedicate so much time, energy, resources, and effort – all with the goal of becoming quite simply the best they can be (p.4).

However, seeking an understanding of the nature of sports performance cannot rely solely upon the obvious critical physical capacity/skills necessary for successful task execution, for even the most physically highly trained and skilled athletes and teams often fail to deliver high performance results. Adding to the importance of this line of enquiry is the fact that sporting tasks typically occur in competition settings that are, by definition, pressure situations, thus dictating that mental skills are also necessary in the quest for sports performance.

In response to this reality, much research effort has been devoted to a consideration of the mental capacity/skills that are required to support such endeavours. One line of enquiry has resulted in attention theories such as Explicit Monitoring and Distraction, which seek to explain sports performance in terms of shifts in attention during task execution [47]. A second research focus is the role played by emotions, and more recently emotional intelligence in sports performance [55,56]. Interest in this area is understandable given the nature and extent of the mental challenges facing athletes; a reality highlighted by Perlini [56] who observes that:

The task of being an elite professional athlete requires the effective management of stress, tolerance of frustration, regulation of mood, and exercise of emotional restraint, within public purview and scrutiny (p.3).

It is suggested that one could reasonably conclude that the task of emotional control implicit in this observation warrants being expanded to include the ability to cope with the mental challenges associated with shifts in attention when under pressure to perform as outlined in attention theories. From this it can be posited that firstly, at the level of the mental game, achieving competitive sports performance is dependent upon the degree to which an individual athlete or team is able to effectively carry out physical task execution in the face of pressure, rather than fall prey to shifts in attention. Secondly, the extent of this ability will be related to an individual athlete or team's level of emotional control, and performance emotional intelligence.

Taken together, it is argued that these two areas of research may offer insight as to how the mental game is implicated in sports performance generally and, arguably the holy grail of coaching sustained competitive advantage in particular. The foregoing informs the authors' point of departure in undertaking this current study, and forms the basis for their view that an analysis of the proposed link between attention, emotional intelligence and sports performance is a worthwhile and important line of research.

In considering attention theories, the Explicit Monitoring version suggests that anxiety born of performance pressure ushers in a need for control that shifts attention away from actual task execution and inwards to a reflection upon the specifics of how to execute the task. In effect this amounts to what can be termed "thinking too much in the moment", which is seen to undermine learned execution skills. Failure to secure such control is seen to be implicated in the phenomenon "choking under pressure", which results in sub-optimal task performance [48-51].

The Distraction version, on the other hand, claims that under pressure the sports performance of athletes suffers as a result of shifting their attention outside, onto cues and stimuli that are unrelated to the specific task at hand. Such an attention shift could, for example, take the form of a preoccupation about the consequences of performing poorly and letting the team down. As Beilock [47] notes, the effect of such distractions is a change from a single to a double task performance situation, and the dual attention demands this makes upon the individual overloads available working memory and leads to a degradation of performance in the original task.

The mental process of shifting attention, either overly inward or outwards would seem to be a potentially self-defeating response to the challenge of task execution under pressure, risking the undermining rather than aiding of sports performance. This raises the issue as to whether or not athletes consciously choose to embark upon such fatally flawed shifts of attention, or if they are in some way impelled to do so. Fear of failure, for example, may occur when an athlete unconsciously interprets a task performance situation in such a way as to induce performance anxiety and a shift in attention (i.e. taking a penalty in a soccer match; opening the batting in a Test match etc.). According to Epstein (1998), the potential for poor task performance in

such situations would seem to be explicable in terms of a destructive rather than constructive thought sequence and chain of reactions, in which emotions play a role in compromising an athlete's behavioural response and task performance [52].

Insight into this area of mental capacity/skills in sport is sought by researchers focusing upon the impact of emotions and mood states on sporting performance [55,57-63]. Existing knowledge from such studies indicate that successful sporting performance is enhanced with optimum emotions and mood states [60]. In addition, psychological skills training programs can assist in achieving these emotions and mood states [59]. However, whilst this psychological research of emotions in sport shows promise, it is the case that the findings are not consistent [57], and further, there is a real need to move beyond the exclusive considerations of emotions and mood states as the sole psychological determinants of performance [64]. In this regard, a relatively new research focus based upon the concept emotional intelligence has potentially opened up the prospect of garnering new insights into the relationship between emotions and sports performance [65].

An early definition of emotional intelligence was [25]:

An ability to recognize the meanings of emotions and their relationships, and to reason and problem-solve on the basis of them. Emotional intelligence is involved in the capacity to perceive emotions, assimilate emotion-related feelings, understand the information of those emotions, and manage them. (p.267).

A more recent and succinct version defines emotional intelligence as [66]:

A set of skills concerned with the processing of emotion-relevant information. (p.97).

Notwithstanding the relative newness of the construct, emotional intelligence research suggests it is associated with successful performance across a range of performance domains, including academia and business [67,68]. In organizational settings, for example, studies have shown that emotional intelligence can distinguish between outstanding and average individual performance [69].

In addition, studies indicate that to be effective within organisational teams, team members benefit from a high level of emotional intelligence in order to deal with

interpersonal and intrapersonal conflicts, enhance communication and commitment, and to accomplish team goals [70,71]. Effective organisational teamwork itself is seen to be influenced by the collective emotional intelligence of its members, and members tend to share emotions, both positive and negative, with positive emotions and harmony both improving and predicting team effectiveness [72,73]. That emotions are directly implicated in team performance is evident where the effectiveness of a team seeking to generate and implement decisions is dependent upon positive affective relationships among its members being maintained [74]. Further, affective acceptance of decisions, not merely consensus, is necessary for effective implementation and sustainable high performance [75]. Added to this, it is significant that both individuals and teams can build their emotional intelligence [71]. Whilst the diversity of occupations in extant studies that have suggested a link between emotional control and occupational success is limited, such findings are regarded as adding weight to the proposition that emotional intelligence may also be a predictor variable in the domain of sports performance [56]. This view is in line with claims that several aspects deemed critical to occupational success and related to emotional intelligence also pertain to sport [76,77]. Such perspectives would seem to enhance the motivation and justification for research in this area of sports performance [46,56].

In the competitive world of sport, not unlike that of other domains such as business organisational settings, achieving high performance both at the individual and team level can be seen to require control over, as opposed to being controlled by emotions. In other words, in the quest for competitive advantage and desired sports performance outcomes the mental game, at the level of emotional control, can be seen as a critical capacity to compliment the physical game. In terms of emotional intelligence as defined by Salovey, Mayer and Caruso [25], achieving such emotional control is related to skill in four branches, namely the perception, facilitating, understanding and managing of emotions. In essence, this model of emotional intelligence posits that the greater the level of skill in these branches the greater the capacity to exercise emotional control and perform achieve more effective behavioural responses. Conversely, where this skill/capacity is found wanting both individual and team sports performance may potentially be compromised through relatively poor management of the emotional component of sporting situations and

concomitant impoverished behavioural responses that serve to undermine desired performance outcomes.

A related and manifestly obvious feature of team sports, such as soccer, rugby, basketball, ice hockey etc. is the reliance upon effective teamwork in order to consistently achieve competitive sports performance. This reality is aptly summed up by basketball legend Michael Jordan who stated that, "Talent wins games, but teamwork wins championships" [78]. Although the time-frame of a game in which this critical teamwork must ideally be achieved and maintained varies depending upon the sport, it is usually of a relatively short duration. A game of soccer, for example, lasts for ninety minutes with a fifteen minute break at half-time. Similarly, in the case of rugby a game last for eighty minutes with a fifteen minute break at half-time.

A notable exception, however, is the very popular worldwide sport of cricket. Though also exemplifying the need for effective teamwork, cricket differs markedly in terms of the time it takes to complete a game. In the case of international Test cricket, for example, a game can last for up to five days. Even the limited fifty overs day/night format of cricket can take the best part of a day to achieve a result. It follows that a defining characteristic of cricket, relative to most other team sports is that of endurance. The members of the fielding team, for example, are often required to stand in the field for the whole day's play, even consecutive days, and face the task of remaining focused on every single ball being bowled. Also, they must communicate effectively with other team members in order to ensure the strategically requisite attacking or defensive field placement. Equally, members of the batting side may spend many hours at the crease in the quest for runs. As a game of cricket progresses, the pressure mounts for both teams to either bowl the opposing team's remaining batsmen out or score the required number of runs in order to secure a win. It follows that there will be a concomitant demand on both teams for emotional control in terms of the four branches of emotional intelligence.

From the individual perspective, a cricketer's performance, whether batting, bowling or fielding is certainly dependent upon his physical game (i.e., skill, technique, eye/ball coordination, strength, and speed between the wickets etc.). However, it

would also be a function of his mental game, which would include his emotional control capacity to deal with performance pressure situations.

For a batsman, these pressures are many, including attacking field placing, “sledging” comments from the slip cordon and wicketkeeper, slow outfielders, crowd noise, visibility, and different types of bowling, such as fast, swing, and spin, as well as disguised changes of pace. This pressure reality is typified in the case of a batsman who is lacking in technique when playing spin bowling. Coming into bat, and having to face his frequent nemesis, a spin attack, especially in combination with an attacking field, such a batsman would likely experience negative emotions, such as fear of failure to score many runs, or worse still being out for a duck. However, in such a situation, having the ability to be aware of negative emotions while in the clubhouse, padded up and waiting to bat, and then actually at the crease taking guard (perception); use emotions to shift to a more positive perspective (facilitation), analyze how the emotions developed and are likely to unfold, such as initial fear escalating to panic (understanding), and deal with the emotions so as to derive an effective behavioural response, such as use feet to get to the delivery, and watch the ball onto the bat (managing), can be seen to be hallmarks of the sports performance benefit of emotional intelligence.

In the absence of sufficient emotional intelligence, the potential failure to handle such performance pressures, in terms of perception, facilitation, understanding and managing of emotions places batsmen potentially at risk of succumbing to the effects of those emotions and moods that compromise task execution, such as shifts in attention, or “giving their wicket away” by playing an injudicious “emotional shot” rather than a “cricket shot”.

The physical game of bowlers can be seen to be no less important, allowing them, for example, to bowl accurately to the correct line and length to suit the captain’s field placing. However, the mental game component becomes critical when, for example, a bowler is under pressure to take wickets, yet is being dominated by the batsmen. In the face of such pressure, failure to exercise a high level of emotional control can potentially result in shifts in attention, and a bowler’s physical game

falling apart, with an almost inevitable bleeding of runs necessitating that he be taken out of the bowling attack.

Fielders are also relentlessly under pressure, including the effective execution of critical tasks such as limiting scoring opportunities by ensuring fast pick up and return of the ball to the wicket keeper, achieving run outs, and taking catching opportunities. A fielder that drops a catch, for example, would need to control his emotional response to this failure, and be able to recover from any negative feelings so as to fully focus attention on being prepared for the next catching opportunity.

It seems logical; therefore, that the level of emotional intelligence of players would be a key mental capacity/skill and contributing performance factor in team sports such as cricket. It is the case, however, that only a few research studies have thus far examined the link between emotional intelligence and sports performance at the individual level [56,79,80]. As a result, extant research findings fall short of furnishing compelling evidence in support of such a link. Further, adding to this paucity of substantive empirical evidence, to our knowledge no previous longitudinal study has evaluated the role of emotional intelligence in predicting the sports performance of teams.

Accordingly, this longitudinal study was designed to determine whether or not emotional intelligence, and by implication attention, is associated with team sports performance. The decision to study the sport of cricket was taken because of the endurance demands, both physical and mental placed upon a team as a result of the exceptional duration of a game, and by extension a competition or championship relative to most team sports. Our hypothesis was that the sports performance of a cricketing team would be influenced by the team's total emotional intelligence score.

To test the hypothesis we measured the emotional intelligence of all of the players in all of the teams in the premier South African cricket competition over two years and correlated the teams' total emotional intelligence scores to their overall sports performance.

METHOD

Participants

All six teams in the 2004-5 and 2005-6 South African Domestic SuperSport Series 4-Day cricket competition were studied. This is the premier national cricket competition in South Africa, in which the six professional cricket franchises (formerly provincial teams) play each other home and away (10 games, each of two innings) during the cricket season.

Measurement instrument

In selecting a measurement instrument for this study, the authors were guided by their conception of emotional intelligence which is informed by theoretical and empirical research literature on the construct [25,26,32,44,66,81], and concurs with the assertion that emotional intelligence should be viewed from the perspective of an ability model, thus being founded upon actual ability and behaviour rather than self-report perceptions of ability and behaviour [30].

The critique against the validity of self-report measurements of emotional intelligence is seen as difficult to refute, not least for the following reasons: firstly, a possible lack of awareness of feelings, both of self and others could potentially limit the accuracy of any self-assessment [45]; secondly, the veracity of respondents answers may be compromised as a result of social desirability pressures [40-42]; and lastly, such measures are found wanting in terms of discriminant validity, being more akin to personality constructs than specifically emotional intelligence [43,46,82,83].

Ability approaches to the measurement of emotional intelligence, by way of contrast, are based upon the ability model, and in measuring actual ability and behaviour can be seen to obviate the validity problems associated with a reliance on self-reports. For the purposes of this study, therefore, an ability rather than self-report based measure was seen as more appropriate for use in researching the role of emotional intelligence in sport.

Accordingly, the Mayer-Salovey-Caruso Emotional Intelligence Test V2.0 (MSCEIT) [32] was selected to measure the emotional intelligence of the teams. Emotional

intelligence (EI) as measured by the MSCEIT is conceptualized as an ability to perform tasks and solve emotional problems that is not affected by issues such as personality, self-concept or response style. The MSCEIT consists of 141 test items that yield a total EI score, measuring two broad areas of EI, namely Experiential EI and Strategic EI. Each of the Area scores relate to two Branch scores for the following four branches of EI as defined by the model [26]:

- 1) **Perceiving and Identifying Emotions** is the ability to recognize how an individual and those around him/her are feeling (Experiential Area). If an individual is aware of his/her own feelings, they are better able to gather accurate information about their environment. Being able to perceive other's emotions is a key to working effectively with other people.
- 2) **Facilitation of Thought** is the ability to generate emotion, and then reason with this emotion (Experiential Area). Emotions have an impact on how different events are interpreted, and certain moods may be more effective for solving problems in different situations. The ability to use emotions to facilitate thought can be a useful problem-solving tool.
- 3) **Understanding Emotions** is the ability to understand complex emotions and emotional "chains", and how emotions change (Strategic Area). This ability helps individuals to use emotional information in gaining personal insight and insight into the feelings of others.
- 4) **Managing Emotions** is the ability that allows an individual to manage his/her emotions and those of others (Strategic Area). Being able to manage emotions successfully is vital for any individual to be able to make correct decisions. This ability may require an individual to either stay open to their emotions, or to disengage, depending on the circumstances.

Test items in each of the four branches are measured by two tasks in the MSCEIT. These range from identifying emotions from pictures of people to selecting the best emotional response to a given situation. The MSCEIT Total EI score and the four

Branch scores for each of the six teams in the competition were used as a measure of EI.

Administration of MSCEIT

The MSCEIT was administered to players in all six teams at their respective pre-competition training camps. The players were informed about the nature and objectives of the research study, and that their participation was voluntary. Each player was asked to sign a consent form and confidentiality agreement for ethical purposes.

The concept of emotional intelligence was introduced and explained to the players, and examples were provided to illustrate the differences between IQ and EI. The method of answering the MSCEIT test items contained in the test booklet on the score sheet was explained, and participants were informed that there was no time limit, but that the test usually takes approximately 45-60 minutes to complete.

Scoring the MSCEIT

The MSCEIT has two options in terms of normative scoring, namely Expert Consensus or General Consensus, both created by the developers in a quest to establish a test that offered objective scoring. They reported the intercorelation between both methods of scoring to be $r = .98$, thus indicating that resorting to the use of either method would generate very similar results [44]. The cricket players' MSCEIT responses in this study were scored using the Expert Consensus method, in which emotion experts had determined which test answers are better, and which are worse. Each respondent's scores were evaluated against the criterion formed by the proportional responding of an expert group in order to establish their score. The expert group used for scoring of the MSCEIT was made up of 21 members of the International Society for Research on Emotions (ISRE). The norm scores for the MSCEIT are reported similarly to traditional intelligence scales, so have a mean of 100 and a standard deviation of 15.

Measuring Individual EI

All professional players from the 2004-5 and 2005-6 SuperSport Series 4 Day Competition teams had their individual EI measured using the MSCEIT instrument to derive:

- Individual player Total EI score
- Individual player EI Branch scores

Measuring Team EI

The Team EI score of each team in the 2004-5 and 2005-6 SuperSport Series 4 Day Competition was derived by calculating the Mean EI score of the team members selected to play in each of the 10 games played by each team. The Mean of each team's Mean EI score for each of the games played was then calculated to derive the:

- Team Total EI score
- Team EI Branch scores

Measuring Team Sports Performance

The sports performance of each team in the 2004-5 and 2005-6 SuperSport Series 4 Day Competition was determined by the number of points scored during the home and away phase of the competition as reflected by their position in the final log standings.

Log points are scored on the basis of an outright win (10 points); a tie (6 points); and bonus points for batting and bowling performances (1-4 points). The merit of using log points as the outcome measure of team performance in this study is that it is an objective and natural composite measure that encapsulates and quantifies the main playing activities determining success over the duration of the competition, namely batting, fielding and bowling.

The competition as described is balanced in design in that each team plays against all other teams, with the home and away component, for example, ensuring fairness. Due to this balanced feature we did not adjust for aspects such as age, strength of opponents, coaches etc.

Data Analysis

A simple linear regression of Team Sports Performance on the Total Team EI score and branch sub-scores was conducted. The data of the two seasons were pooled after testing for a difference in slopes and intercepts between the two seasons. For the regression models the year specific slopes and intercepts for the EI scores were tested. If there was no difference a single regression line was fitted and reported.

A Spearman correlation coefficient was estimated and the data and regression line was depicted in a scatterplot. A significance level of .05 was used. Although the same teams played in the competition both seasons the composition and management of the teams changed. For the regression analysis we therefore made the assumption of independence between the scores of the same team over the two years.

To evaluate the consistency of the emotional intelligence scores over the two years a paired t test was used to compare the Total EI scores in the cohort of players present in both years. To evaluate the reliability of the EI instrument in the South African setting cronbach alpha coefficient was calculated.

Confidentiality

All individual players whose EI scores were measured for the purposes of this research study signed a confidentiality agreement. In terms of this agreement individual players would be entitled to feedback on their own EI scores, and the aggregate scores of their team, but not of any other player or team. Permission was given, within the parameters of confidentiality, for results obtained to be used for research purposes, subject to the level of analysis and publication of results being limited to that of the team.

RESULTS

Descriptive statistics

A total of 121 players completed the EI testing in 2005 and 2006, and of these a total cohort of 104 players were selected and played in both seasons, but not necessarily for the same team. The average MSCEIT score for this cohort was 86.4 (SD = 11.5)

in 2005 and 87.3 (SD = 11.5) in 2006. The difference of .8 (95% CI: .2 to 1.4) was significant, $p=.0063$ indicating a small increase in the Total EI over 1 year in the same player. The cronbach alpha for the Total EI scoring was .77 for the response of the 121 players tested in 2005.

The mean and standard deviation of team performance (Log Points) and team emotional intelligence (EI Total and branch sub-scores) for each season and combined seasons is shown in Table 4.1. The average MSCEIT scores for the cricketers were low in comparison to the standard mean of 100. It is difficult to speculate as to what the possible reason for the below average scores could be without having other South African samples (or international cricketers) with which to compare the cricketer's scores. The standard deviation of the Total Team EI score is 2.4 for both years indicating some consistency in this team level measurement.

Table 4.1: Mean and standard deviation of Log Points and EI Total and branch sub-scores per year.

Scale	Year					
	2004		2005		Combined	
	Mean	SD	Mean	SD	Mean	SD
Log Points	93.57	14.33	94.43	26.10	94.00	20.08
EI Total	86.50	2.43	87.00	2.37	86.75	2.30
EI Per	85.17	2.04	85.50	1.38	85.33	1.67
EI Fac	85.33	2.73	85.50	1.38	85.42	2.07
EI Und	86.50	3.73	86.83	4.12	86.67	3.75
EI Man	89.00	5.29	89.17	5.31	89.08	5.05

Note:

EI Per = Perceiving and Identifying Emotions

EI Fac = Facilitation of Thought

EI Und = Understanding Emotions

EI Man = Managing Emotions

To test the association between the log points and EI scores Spearman's Correlation coefficients were calculated using the pooled data over the two years and are shown in Table 4.2. There was a significant positive correlation found between the log points and EI total ($r = .69, p = .014$) and the EI components Understanding Emotions and Managing Emotions. The correlation coefficients for these three associations were nearly identical. The EI components Perceiving and Identifying Emotions and Facilitation of Thought were not associated with log points.

Table 4.2: Spearman correlation coefficients of Log Points and EI Total and branch sub-scores.

	Log points	EI Total	EI Per	EI Fac	EI Und	EI Man
Log points	1.0					
EI Total	.69*	1.0				
EI Per	-.30	-.06	1.0			
EI Fac	.16	.50	.46	1.0		
EI Und	.69*	.89**	-.33	.17	1.0	
EI Man	.69*	.73**	-.69*	.10	.80**	1.0

Note:

$N=12$ for each pair: * $p < 0.05$, ** $p < 0.01$

EI Per = Perceiving and Identifying Emotions

EI Fac = Facilitation of Thought

EI Und = Understanding Emotions

EI Man = Managing Emotions

The estimated parameters of the final simple linear regression models for the Total and sub-scores are shown in Table 4.3. The estimated regression lines and data points are given in Figures 1 to 5. In all five of the initial regression models fitted with the factors year of competition, EI score and an interaction term between EI score and year of competition, there were no significant interaction effects as well as no significant year effects. Hence a common simple regression model across both years was estimated for all cases.

Table 4.3: Estimated parameters of the final linear regression models for the Total and sub-scores.

		Regression parameter			
		Slope	p-value	Intercept	p-value
EI Total	Estimate	6.8	.007	-498.9	.003
	95% CI	3.0 to 10.7		-830.5 to 167.3	
EI Per	Estimate	-3.2	.273	363.1	.410
	95% CI	-11.3 to 5.0		-334.7 to 1060.9	
EI Fac	Estimate	1.3	.952	-15.9	.682
	95% CI	-5.5 to 8.1		-596.1 to 564.1	
EI Und	Estimate	4.5	.005	-291.7	.001
	95% CI	2.4 to 6.5		-473.7 to 109.7	
EI Man	Estimate	3.3	.010	-198.7	.001
	95% CI	1.7 to 4.8		-339.1 to -58.3	

Note:

EI Per = Perceiving and Identifying Emotions

EI Fac = Facilitation of Thought

EI Und = Understanding Emotions

EI Man = Managing Emotions

For the simple linear regression model EI Total emerged as a significant predictor of Team Sports Performance as measured by the log points. The Team Total EI in this model explains 61% of the variation in the log points. The estimated slope for EI Total was 6.8 log points (95% CI: 3.0 to 10.7), indicating that for a unit change in the mean EI total score for a 'team' their log points should increase by 6.8 points. This equates to a team having competitive advantage that would result in achieving between an extra draw (6 points) and an extra win (10 points).

In Figure 4.1 the scatterplot of the log points against EI Total score is shown by season. The season-specific regression lines as well as the regression line of the pooled data are also depicted and the estimated slopes and intercepts are shown as

well. The season-specific slopes were not significantly different ($p = .242$) and there was no significant season effect ($p = .239$).

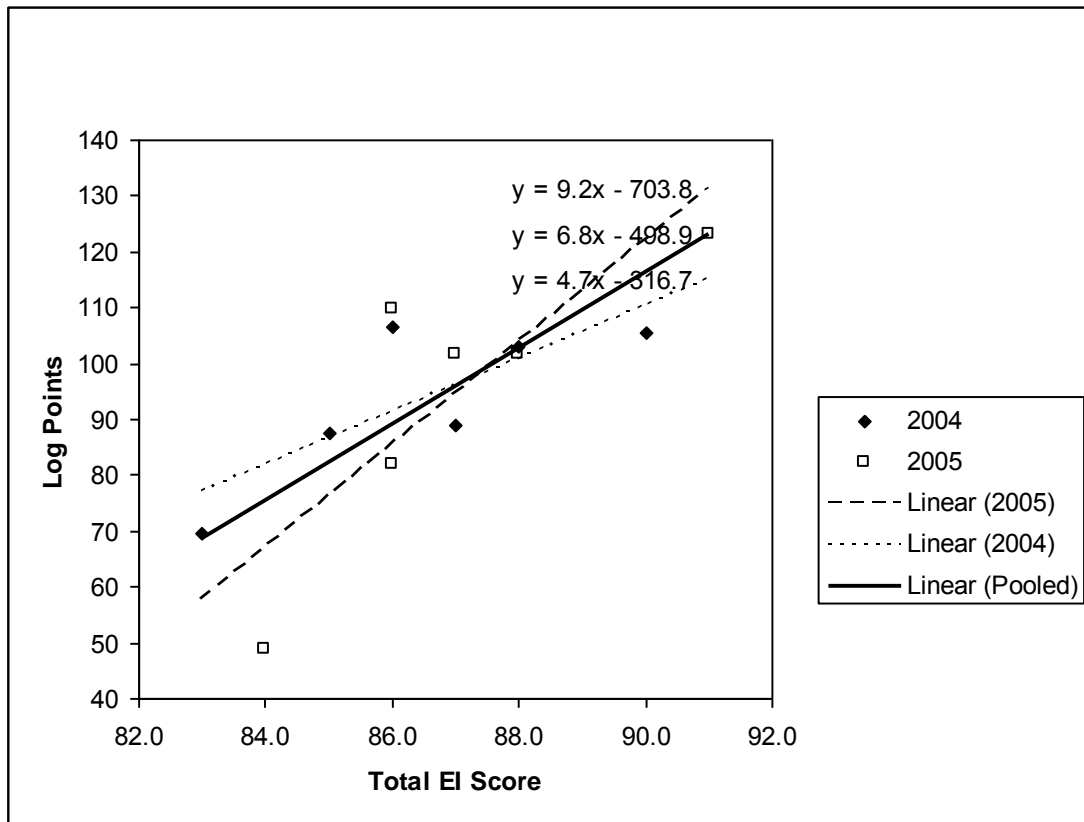


Figure 4.1: Log points against EI Total score by season and pooled.

For the EI components Perceiving and Identifying Emotions and Facilitation of Thought, no association was found with Team sports performance. The data points and estimated regression lines are given in Figures 4.2 and 4.3.

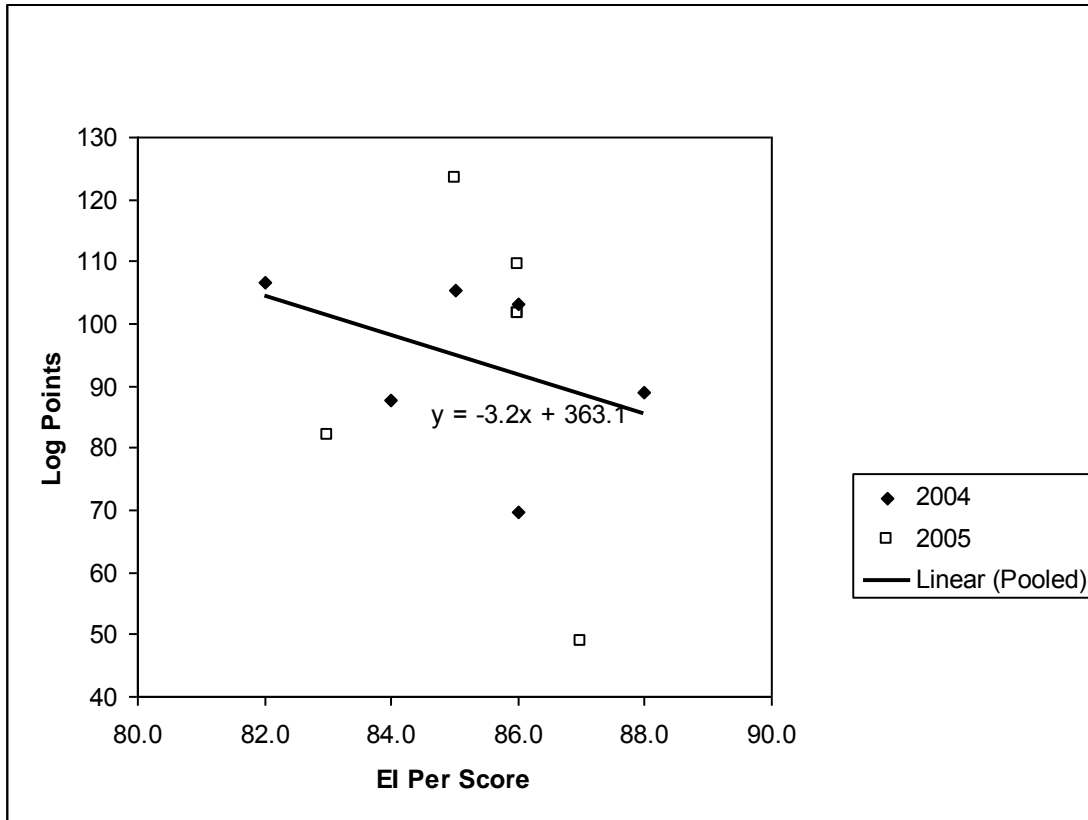


Figure 4.2: Log points against EI Perceiving and Identifying Emotions branch score by season.

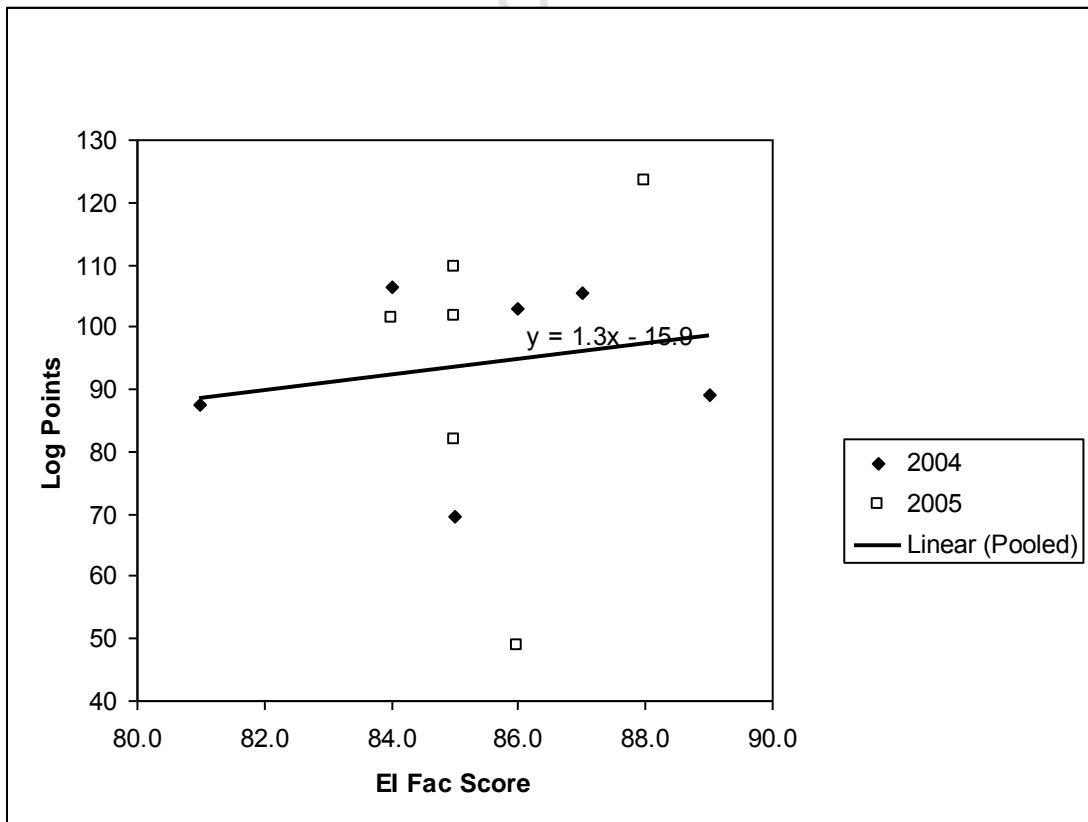


Figure 4.3: Log points against EI Facilitation of Thought branch score by season.

The EI components Understanding Emotions and Managing Emotions were significantly associated with Team sports performance. In Figures 4.4 and 4.5 the data points and regression lines are shown. Both these sub-scores showed a positive association with Team sports performance although the estimated slopes were smaller than that of the Total score.

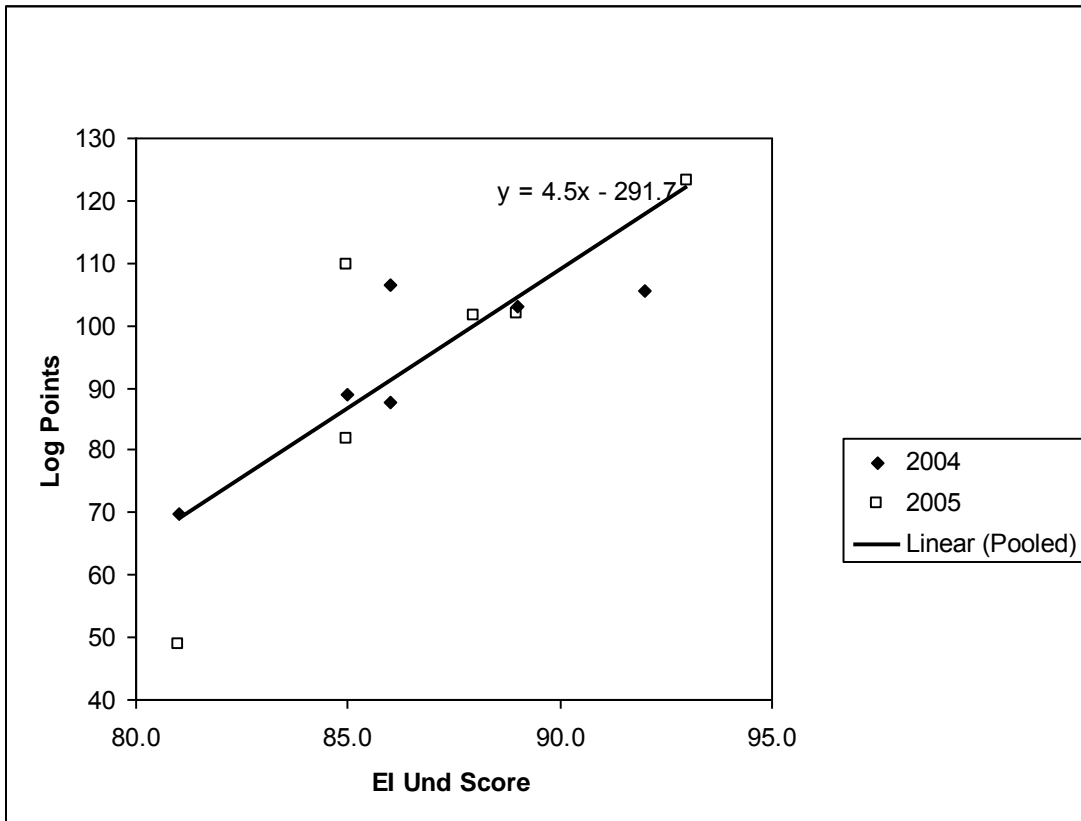


Figure 4.4: Log points against EI Understanding Emotions branch score by season.

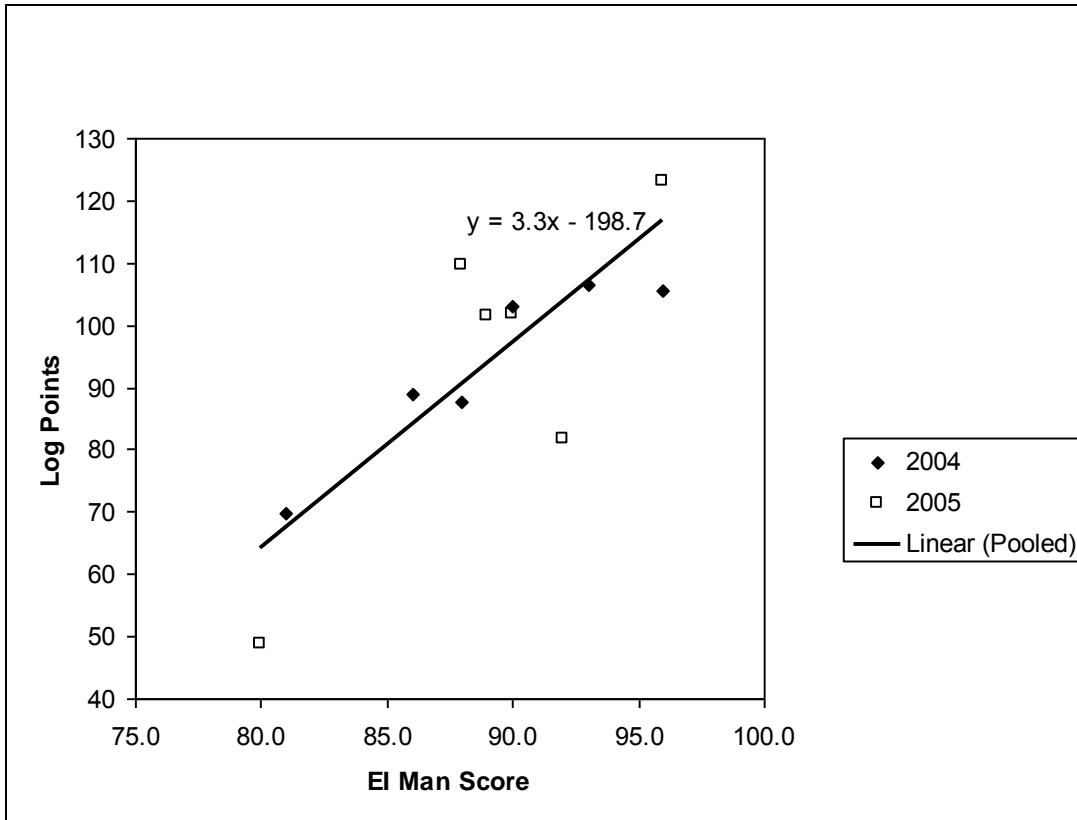


Figure 4.5: Log points against EI Managing Emotions branch score by season.

The EI Total score displayed the steepest slope of the three scores that were found to be associated with log points. Per unit change in EI scores, the mean EI Total score of a cricket team predicts the largest change in log points or performance (6.8 points). The amount of variation explained by each of the three scales (Total EI, Understanding Emotions and Managing emotions) was nearly identical ($r^2 = 0.48$).

DISCUSSION

The hypothesis tested in this study was that the emotional intelligence of cricket teams would predict their sports performance for a season. Accordingly, the important finding of this study was that there was a significant association between the emotional intelligence of the studied teams, as measured by the MSCEIT, and their performance in terms of points obtained on the log. This association was consistent over two consecutive seasons and a pooled analysis confirmed the general hypothesis. To our knowledge this relationship has not previously been shown, and thus this study makes a novel contribution to the literature. In an effort to understand this relationship, a number of reasons could be offered to explain why, in

the opinion of the authors, the higher the EI of a cricket team could perhaps amount to a competitive advantage.

In general terms, the suggested link between the level of a cricket team's EI and competitive advantage during a game can be seen to be explicable in terms of the mental skills/emotional control abilities inherent in both the experiential area (perceiving and facilitation) and strategic area (understanding and managing) of the construct emotional intelligence [26].

Firstly, players of a team with a relatively high Total EI would likely have greater mental capacity/skills to exercise emotional control under pressure, and therefore be better able to optimise their emotions and mood states to achieve higher cricketing performance during a game. By implication, having this form of control could potentially reduce the risk of poor task execution caused by the "choking under pressure" phenomenon as suggested by attention theories. A soccer team's chosen penalty taker, for example, would possibly be able to automatically attend to the learned execution of putting the ball in the back of the net, rather than be distracted by anguishing about fear of failure. Equally, a high EI opening batsman would perhaps have the requisite mental capacity/skill to stay focused on playing each ball on its merits, rather than worrying, for example, about having been out for a duck in the previous innings, or being needlessly run out by an inability to control his emotions in the face of pressure to increase the run rate.

Secondly, the performance of cricket teams over time cannot escape losses of form by team members, or failure to win matches. However, a cricket team with higher levels of emotional intelligence would be potentially more aware of and better understand the possible deleterious effects of negative emotions on their current and future performance, and as a result more effectively manage the emotions and mood states generated by cricketing failure.

Thirdly, teams with higher levels of emotional intelligence would potentially better manage the negative emotional impact of cricketing controversy on their sports performance, such as allegations of ball tampering, bowling action (throwing), and poor standards of umpiring decisions during a match.

The findings of this study have implications for sports science research, education and coaching of individual athletes and teams. In seeking to establish bases for high performance and competitive advantage in sport, it would appear that emotional intelligence as a potential predictor variable has much to offer sports science researchers. Further, in the quest for improvement in sports performance, the results of this study suggest a role for higher emotional intelligence, and indicate a need for the inclusion of emotional intelligence education in the coaching and managing of sports teams and a concomitant education research emphasis on the development of effective emotional intelligence training and development interventions.

These suggestions would seem particularly relevant given the study's hypothesis, and in light of the important findings that prove a significant positive association between the independent variable emotional intelligence and the dependent variable sports performance. Also, considering the central role played by coaches in sport, it would seem prudent to recommend research studies that examine the possible link between coaches' emotional intelligence and their coaching performance. However, it is noteworthy that research findings on the link between emotions and sports performance are equivocal [57]. Anger, for example, has been found to be related to successful performance in some studies, and poor performance in others. Such contradictory results highlight the need for further research into the role of emotions/emotional intelligence in sport, both at the individual, team, and coach level. In carrying out such research studies it is suggested that they cover a wide range of both individual and team sports.

The reliability of the MSCEIT in this study setting and population was good. From the cohort analysis there is no evidence of a self-learning effect from year to year.

The authors acknowledge limitations of this study, including the fact that the research sample data was confined to only a single sport, namely cricket, and the level of analysis was at the team level. Further, the competition used in the study was small, and whilst spanning the entire professional game of domestic cricket in South Africa, there were only six provincial (franchise) teams in each of the two consecutive years of the study. It is suggested that future research focus on multiple team sports, as well as competitions with larger numbers of teams participating. In

addition, the scoring in this study was based upon North American normative scores, and these may not necessarily have been applicable to the South African sample. No adjustments were made for possible confounders such as age, level of team coaching etc. With regard to claims that ability rather than self-report based measures may be preferable for researching EI in sport [46], it has also been highlighted that notwithstanding the merits of the MSCEIT measure used in this study, it is by no means perfect [30].

Finally, the construct emotional intelligence has attracted both adherents and detractors, resulting in both consensus and controversy that ranges from ontological to epistemological [46,84]. These unresolved issues related to emotional intelligence clearly have implications for researchers and those in professional practice seeking to understand the nature of sports performance, and therefore warrant rigorous research investigation.

CONCLUSION

The important finding of this longitudinal scientific research study is empirical evidence showing a significant positive relationship between the emotional intelligence, as measured by the MSCEIT, of the teams studied and their sports performance in a national cricket competition. The results add support to the view that the mental game of sports teams is critical to achieving competitive advantage, and in this regard the role of emotional intelligence can be seen to contribute to predicting a team's sports performance.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the assistance of Cricket South Africa and, in particular, Mr Vince van der Bijl, General Manager Cricket Development. The authors would also like to thank Jopie van Rooyen & Partners SA for their support in the assessment process.

CHAPTER 5: The Development of EI

5.1 EI development debate

Despite the seemingly intractable ongoing debate and lack of consensus as to the nature and measurement of the construct EI, assertions on the part of practitioners concerning its importance and benefits has resulted in widespread and increasing interest in its application across disparate organisational settings. In particular, such acceptance can be seen to be fuelled by claims that EI can be developed through training programs [71,85,86]. However, commentators have cautioned that given the lack of studies providing supporting empirical evidence of the efficacy of such programs, it is questionable whether the claimed development outcomes can be realised [29,46,87]. In this regard, Clarke, N [87] states that:

Little has appeared in the literature that details the effectiveness of EI development programs or methods based on findings from studies so far [87] p.423.

In a review of a number of EI development research studies conducted and reported in the literature it was found that overall they failed to furnish solid evidence of the efficacy of the programs. Further, few details of the programs implemented were provided, and significant limitations were evident in respect of elements of the research design and conclusions drawn [88]. Commenting on these findings the authors expressed their view that:

The field of EI training has a less than stellar reputation owing to the number of training purveyors that exist but absence of high quality empirical evidence regarding the efficacy of the training they provide [88] p.19.

5.2 EI training program design and implementation guidelines

The call by critics and commentators for more scientifically based research examining the developmental potential and outcomes of EI interventions has seen a growth of interest in this research area which is reflected in the literature [85,86,89-93]. A critical consideration in the creation of EI development training programs for use in such studies is the need to ensure they are appropriately designed and

implemented. It has been argued that emotional learning is different from cognitive and technical learning which informs the design of typical programs, and thus the design of EI training programs requires a different approach [94].

Following a research study that reviewed extant training and development literature, comprehensive best-practice guidelines for the effective design and implementation of EI intervention programs were identified [94]. The proposed guidelines correspond to the sequential four phase development process of preparation, training, transfer and maintenance, and evaluation. Although additive and synergistic, to be effective not all the proposed guidelines need be included in a program. However, it is argued that the greater the extent of adherence to these guidelines, the more a program will be enhanced and the greater it's potential for success [94].

5.3 EI training program design – use of mixed model EI conceptualisation

Related to the relationship between EI training program design and development outcomes is the central role played by the conceptualisation of EI in shaping EI training program designs. This point is highlighted by criticism levelled at the mixed models of EI in respect of the ambiguous and multifaceted manner in which the construct is conceived, and concomitant problematic self-report measurement issues [95]. It has also to be argued that not only do these models fail to meet the conceptual and correlational criteria of an intelligence, but also their measures of EI largely mirror those of the personality and social attributes [82,96,97]. As argued by Clarke [87]:

Training programs aimed at developing EI based on mixed and/or personality models offer little more than a repackaging of previous soft-skills training and as a result offer us little in the way of better understanding the true potential of EI [87] p.423.

5.4 EI training program design – use of ability model EI conceptualisation

Against this, Clarke [87] argues that the ability model of EI offers a far more defensible conceptualisation of the construct EI [22,66,82]. In particular, relative to competing approaches it has been argued that the ability model can be shown to more adequately embody the criteria necessary to accord EI the requisite status of

an intelligence. In light of such views there is emerging an increasingly cogent argument in favour of tethering EI research efforts to the ability model, and by implication the ability test approach to its measurement [87,97]. Unequivocal support for this argument can be found in a review of EI development studies in which the ability model was the basis for the research and informed the training program design [98,99]. The conclusion drawn emphasised that these studies exemplified what is possible, and auger well for future research in the area [91]. Echoing these views, it has been argued that at the scientific level the construct EI has continued to be the focus of theoretical development, and can justifiably be seen to be founded upon an increasingly relevant body of substantive research [29].

5.5 EI development in sport

As noted previously, EI research in the realm of sport has begun to garner increased scientific research interest in the role of EI in influencing sports performance. Performance pressure situations are found at all levels of sport, with the competitive nature of professional sporting codes in particular placing relentless demands upon athletes and teams to exercise the emotional control needed to deal with the pressure necessary to achieve high performance [56]. Exemplifying this EI challenge is the sport of professional cricket, and in a recent prospective longitudinal study referred to in chapter 3 it was shown that the EI of cricket teams in a national cricket competition was a predictor of their sports performance [53].

5.6 EI Training and Development Longitudinal Study

It follows logically that for cricket teams to have greater competitive advantage the EI of individual cricketers must be increased. Although there is a paucity of empirical research evidence to support the contention that EI of individual athletes can be increased, one recently reported study based upon a mixed model conceptualisation of EI and self report measurement approach examined the effect of an EI training and development program across different sports disciplines. The results suggested that the EI profile of athletes could be developed through such an intervention [100].

To test the hypothesis that the EI of cricketers can be developed using a training program design based upon identified guidelines and informed by the ability model conceptualisation of EI and ability measurement approach to EI, an experimental

longitudinal study was carried out and the findings reported in the International Journal of Sports Science and Coaching [53]. The published paper is shown in Chapter 6.

CHAPTER 6: Published empirical research EI journal article

6.1 The following material was published:

Crombie, D.T., Lombard, C. and Noakes, T.D., Increasing Emotional Intelligence in Cricketers: An intervention study, International Journal of Sports Science & Coaching, 2011, 6(1) 69-86.

ABSTRACT

Objectives: The purpose of this study was to investigate the effect of emotional intelligence (EI) training and development on the EI profile scores of individual cricketers. **Methods:** 24 players attending the South African National Cricket Academy were randomised to an intervention group (EI training and development intervention program) or control group (no intervention). The experimental design was executed in 2007 and 2008 with different cohorts of players. The EI of the players was measured pre and post intervention using the Mayer, Salovey & Caruso Emotional Intelligence Test (MSCEIT). **Results:** In 2007 the baseline Total EI score for the intervention group was 84.9 and the post intervention Total EI score was 96.6, giving a relative increase of 13.7%. By comparison, the baseline Total EI score for the control group was 81.8 and post intervention the Total EI score was 83.4, giving a relative increase of 2%. In 2008 the baseline Total EI score for the intervention group was 89.4 and the post intervention Total EI score was 101.7, giving a relative increase of 13.8%. By comparison, the baseline Total EI score for the control group was 87.4 and the post intervention Total EI score was 84.8, a relative decrease of 3.1%. The estimated intervention effect for the percentage change in Total EI score over both years is 14.5% (95% CI: 11.9 to 17.2%) and is significant. **Conclusions:** EI training and development may contribute to increasing the EI profile of individual cricketers.

INTRODUCTION

Whilst research into the relationship between emotions and sport performance is a well established field of study, the relationship between emotional intelligence and sport performance is a more recent research focus and addition to the literature [1-6]. Interest in this area of sports performance is understandable given the

competitive nature of sport. As Perlini [56] notes, professional athletes are faced with the task of effectively managing their emotions in full view of the sporting public and media. It is suggested that how well an athlete or sports team meets this challenge will be determined by the extent of their mental skills/emotional control inherent in the ability model of the construct EI [53]. During a game, for example, a high level of emotional control could provide a competitive advantage by potentially reducing the risk of poor physical task execution caused by the “choking under pressure” phenomenon as posited by theories of attention such as explicit monitoring and distraction. [47,50,53]

However, this promising empirical research endeavour is not without controversy, as EI has attracted both adherents and detractors, resulting in an ongoing debate characterised by diametrically-opposed views relating to fundamental nature, measurement, and developmental issues [101]. The central question, for example, as to whether or not EI can legitimately be termed an intelligence has elicited divergent opinions, as has the thorny issue of its measurement and psychometric properties, together with claims and counter claims regarding the possibility that an individual’s EI can be improved. [30,45,46,83,84,87,102,103].

NATURE OF THE CONSTRUCT EI

Drawing on the long tradition of cognitive intelligence research, together with the theoretical threads of the emergent collaborative field of cognition and affect and efforts directed towards non-cognitive intelligence theory, the seminal work of Salovey and Mayer resulted in their development construct EI as an empirical research field of study [21]. Their quest to develop a theory of EI was founded upon this definition:

Emotional intelligence is a form of social intelligence that involves the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions [21] p.189.

From the outset their theoretical focus was founded on a narrow and scientific conceptualisation of the construct strictly in terms of a set of non-cognitive emotional abilities that capture the interplay of emotions and intelligence.

Refinements to this initial definition led to a later version which re-stated it as:

Emotional intelligence refers to an ability to recognise the meanings of emotions and their relationships and to reason and problem-solve on the basis of them. Emotional intelligence is involved in the capacity to perceive emotions, assimilate emotion-related feelings, understand the information of those emotions, and manage them [25] p.267.

This conceptualisation informs the resultant benchmark mental ability-based model of the construct EI.

From the foregoing it is suggested that the conceptual and practical value of the construct EI can be seen to be as a “new” non-cognitive intelligence that permits a posited more holistic IQ/EI duality model of intelligence drivers of human performance, as shown in Figure 6.1, than that of the much criticised one-dimensional cognitive intelligence/IQ model [9,25]

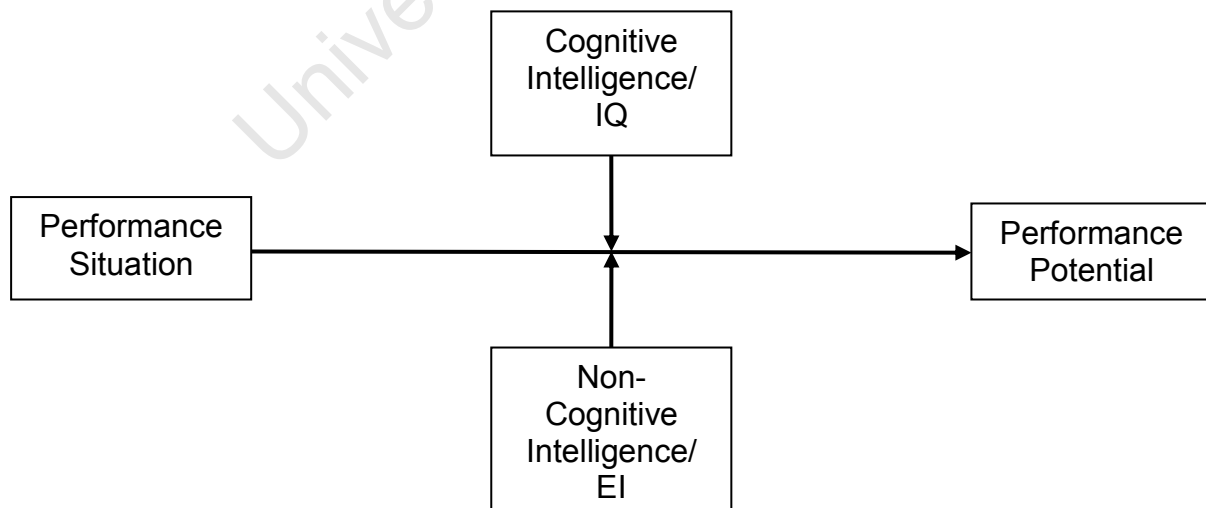


Figure 6.1: *IQ/EI duality model of human performance potential.*

In terms of this study, it is argued that the conceptual and practical value of the construct EI, as well as its measurement adds value insofar as they support and inform the IQ/EI duality model of human performance that underwrites the development and implementation of the study design and intervention program used.

In the wake of the pioneering work of Mayer et al [25], controversy in the field arose as this conception of EI was expanded by others to embrace a host of dimensions found in the domain of personality theory. This development saw the emergence of what became known as a mixed model of emotional intelligence [27-29].

Whilst some commentators have suggested that these different conceptualisations and definitions are more complementary than contradictory [22], opposing and seemingly irreconcilable views persist [29,30]. Thus the contemporary and controversial history has seen essentially two conceptualisations emerge regarding the nature EI. There is the original, scientific and narrowly focused approach that informs the ability model, and the popularised much broader approach of the mixed model. Their coexistence has been rather aptly described as:

EI spans two worlds: that of the popular psychology, with its best-selling volumes on co-dependence, personality types, healing of the soul, and jazzy newspaper science, on the one hand, and that of careful, painstaking research science, on the other hand. This intersection creates a rather uneasy tension at times, and often misleading cross talk [31] p.xiii.

MEASUREMENT OF EI

Related to the conceptualisation divide of EI, the field has seen conflicting views on how the construct can be measured. Here the standoff takes the form of ability tests, (e.g. MSCEIT) [104], versus self report approaches, (e.g. ECI, EQ-I,) [36], each approach exhibiting differences in psychometric properties to the extent that they could be seen to be measuring different constructs [39]. Whilst concerns about existing EI measurement approaches have been expressed, it has been argued that the MSCEIT ability test is a far more accurate measure of distinct emotional abilities

than self-report measures [83,97]. However, with both approaches being used to measure EI this has added further controversy and confusion to the debate [43]. It follows that the absence of any substantive consensus with regard to defining and measuring EI presents an impediment to progressing scientific research in the field [44-46]. This divisive situation has given rise to a number of recurring arguments that express the negative sentiments of the detractors of EI. In essence, the central claims of these detractors are that it amounts to little more than a collection of existing personality traits, falls short of requisite psychometric standards, and lacks consensus with regard to a method of measurement [30]. However, against this no less cogent arguments are made by those supporting the construct, though this is tempered by which particular conceptualisation of EI is considered bona fide [29,30].

DEVELOPMENT OF EI

Notwithstanding the contentious and seemingly intractable issues surrounding both the nature and measurement of EI, there has been a burgeoning interest in its application across disparate organisational settings [67-69,71-74,105,106]. Such widespread interest and acceptance was undoubtedly due to the claims of practitioners concerning of the construct's importance, espoused benefits and utility, as well as being able to be increase EI through training and development [71,85,86]. These claims have led commentators to question the basis for the meaning and status of EI, and cautioned as to the likelihood of achieving the envisaged development outcomes, as well as the need for studies that will offer supporting evidence [29,46,87].

In this regard, as noted earlier there is a growing interest in scientific research expressly focused on EI in the realm of sport which has been reflected in the literature [85,86,89-93]. That there is a need for effective emotional control in both individual and team sports, and at all levels of competition, is self evident. In the case of professional sporting codes in particular, which are synonymous with pressure situations the demand upon athletes to achieve high performance is relentless. This challenge is exemplified in the popular worldwide sport of cricket. In a recent prospective longitudinal study it was shown that the EI of cricket teams in a national cricket competition was a predictor of their sports performance [53]. It

follows logically that if the EI of individual cricketers could be developed, then potentially their sports performance and the competitive advantage of their respective team would be enhanced.

Although there is a paucity of extant research evidence to support this view, one recently reported study based upon a mixed model conceptualisation of EI and self report measurement approach examined the effect of an EI training and development program across different sports disciplines. The results suggested that the EI profile of athletes could be developed through such an intervention [100].

The purpose of this study was to determine whether or not the EI of individual cricketers as conceptualised by the Mayer et al ability model, and measured using the MSCEIT [32] ability test approach could be developed through the intervention of a combined generic/cricket specific experiential learning case study EI training and development program. To our knowledge no previous study has evaluated the effect of such an intervention program on the EI profile scores of individual cricketers. Our hypothesis was that the intervention of an EI training and development program would result in an increase in the EI profile scores of individual cricketers, and perforce the mean EI scores of the experimental group.

METHOD

Ethics

Ethical approval of the study was approved by the Research and Ethics Committee of the Faculty of Health Sciences at the University of Cape Town.

Confidentiality

All individual players whose EI scores were measured signed an agreement for confidentiality and ethical purposes. In terms of this agreement individual players would be entitled to feedback on their own EI scores, and the group mean EI scores, but not of any other individual player. Permission was given, within the parameters of confidentiality, for results obtained to be used for research purposes, subject to the level of analysis and publication of results being limited to that of group mean scores.

STUDY DESIGN

Study Participants

The South African National Cricket Academy is the premier cricket coaching institution in South Africa, based at the High Performance Centre, University of Pretoria and annually selects ($n = 24$) talented emerging cricketers from all the provinces for cricket development coaching. There were no inclusion/exclusion criteria imposed on the part of the study authors, thus the selection criteria of the Academy in each of the two consecutive years was the basis for participation of individual cricketers in this longitudinal research study.

The participants were informed about the nature and objectives of the research study, and that their participation was voluntary. Each player signed a consent form and confidentiality agreement for ethical purposes.

Randomisation to groups

To test the hypothesis a prospective randomised controlled clinical trial design was used, in terms of which each year the Academy's cohort list ($n = 24$) of selected players was randomised using a simple random probability sampling method of odd numbers on the cohort list into an intervention group ($n = 12$) and even numbers into a control group ($n = 12$). The resultant two groups were compared in terms of their demographics to assess how well the two groups were matched.

Measurement of EI

The MSCEIT ability approach utilized in this study consisted of a series of emotion-based problem solving test items that derives for each participant an individual Total EI score. Further, as shown in Figure 6.2, scores for the following two areas and four separate branches of EI as defined by the model are also generated:

Experiential Area of EI

- 1) **Perceiving and Identifying Emotions** – the ability to recognize how an individual and those around him/her are feeling.

- 2) **Facilitation of Thought** – the ability to generate emotion, and then reason with this emotion.

Strategic Area of EI

- 3) **Understanding Emotions** – the ability to understand complex emotions and the principles that govern how emotions change.
- 4) **Managing Emotions** – the ability that allows an individual to manage his/her emotions and those of others.

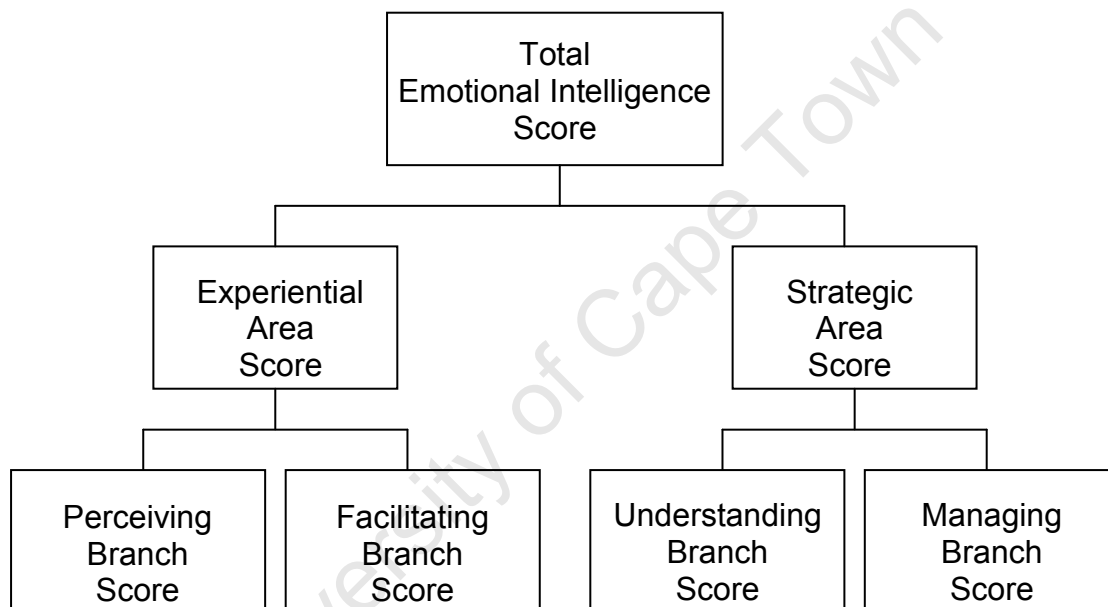


Figure 6.2: *Graphic Representation of MSCEIT Scores.*

The first branch of EI, Perceiving Emotions, is measured by asking respondents to identify the emotions expressed in photographs of people's faces (Faces) as well as the feelings suggested by artistic designs and landscapes (Pictures). For example, in the Faces task, participants are presented with a picture of a person expressing a basic emotion. Below the picture is a list of five emotions; the subject is asked to rate on a five-point scale how much of each emotion is expressed in the photograph.

The second branch of EI, Facilitating Emotions, is measured by two tests that assess people's ability to describe emotional sensations and their parallels to other sensory

modalities using a non-feeling vocabulary (Sensations), and identify the feelings that might facilitate or interfere with the successful performance of various cognitive and behavioural tasks (Facilitation). For example, the task measuring Sensations presents participants with a sentence asking them to imagine feeling an emotion such as shame. Participants are then given a list of adjectives pertaining to other sensory modalities (e.g., cold, blue, and sweet) and are asked to rate on a five-point scale from Not Alike to Very Much Alike how much the feeling of shame is similar to the adjectives.

The third branch of EI, Understanding Emotions, is measured by two tests that pertain to a person's ability to analyze blended or complex emotions (Blends) and to understand how emotional reactions change over time or how they follow upon one another (Changes). For example, a question on the Blends task presents a statement such as acceptance, joy, and warmth often combine to form (.....). Participants are then presented with a list of response alternatives and choose the most appropriate.

The fourth branch of EI, Managing Emotions, has two subtests that assess how participants manage the emotions of others (Social Management), and how a person would regulate his or her own emotions (Emotion Management). For example, the Social Management task asks participants to read a short story about another person, and then determine how effective several different courses of action would be in coping with emotions in the story. Participants rate a number of possible actions ranging from Very ineffective to Very effective.

Administration of the MSCEIT

The method of recording answers to the test items was carefully explained to all participants. They were informed that there was no time limit, but that usually the test would take approximately 45-60 minutes to complete.

Scoring the MSCEIT

The MSCEIT was scored using the expert method, in which emotion experts determine which test answers are better, and which are worse. The expert group used for scoring of the MSCEIT was 21 members of the International Society for

Research on Emotions (ISRE). Each respondent's scores were evaluated against the criterion formed by the proportional responding of the expert group. Respondents receive credit for their answers to the extent that they match those of the experts. For example, if .71 of the experts say for a particular Perception branch test item that there is a moderate amount of sadness in a face and a person chooses that answer (i.e., also indicates that the particular stimulus includes a moderate amount of sadness), that person's score is incremented by .71.

Pre-measurement of EI

Each year all players in both the intervention and control group had their individual EI profile measured prior to the implementation of the program to derive the following baseline EI profile scores:

- Individual player Total EI score and four branch scores.
- Mean group Total EI score and four branch scores

The baseline mean scores for each group were compared to assess how well the groups were matched.

Intervention

The lead author was responsible for facilitating the pre and post measurement process, as well as the design of the EI training and development program, including the generation of both generic and cricket-specific experiential case studies and the facilitation of the intervention process. A central role of the facilitator was to manage the workshop format of the program, with the overriding aim of enhancing EI skills through promoting interactive participation from all group members in analysis and understanding of the role of EI in the experiential case studies presented.

An identical EI training and development program was administered by the facilitator to each year's intervention group. The intervention involved ten three-hour sessions using a workshop format. At the first session two cohesion EI experiential case studies, one generic and one specifically cricket related were introduced, together with an EI analytical framework that served as a unifying guide throughout the program to empower the participants to identify the role of the four branches of EI,

both individually and collectively in shaping the case studies performance outcomes, ranging from failure to success.

In the process of applying the EI analytical framework to the experiential case studies presented during the workshop, each of the four branches of EI were emphasised equally and their role in the case outcomes identified and analysed sequentially in terms of the ability model, namely perception, facilitation, understanding and managing.

The experiential cases were deliberately selected to include a comprehensive spectrum of EI cricketing performance under pressure situations, both on and off the field of play, as well as linking the mental game (emotional control) to the physical game. A further central feature of the program was that each session was designed to be both informative and participative, with time expressly set aside for participants to voluntarily recount their own personal and cricketing experiences relative to the EI topic under consideration through the lens of the analytical framework. Upon completion of the formal program sessions the participants were given clear guidelines, templates and examples on how to keep and analyse a personal experiential EI diary in order to reinforce the insights gained from the program. In the case of the Control group no intervention in the form of an EI training and development program was administered, nor were they introduced to the methods and requirements for keeping an experiential EI diary.

For researchers wishing to replicate this study, information relating to the intervention program material used, including experiential case studies is available upon request from the corresponding author.

Post-measurement of Individual EI

Upon completion of the program all players in both the intervention and control group had their individual EI measured at the same time using the MSCEIT instrument to derive their post EI profile scores:

- Individual player Total EI score and four branch scores.
- Mean group Total EI score and four branch scores

The study design is shown diagrammatically in Figure 6.3.

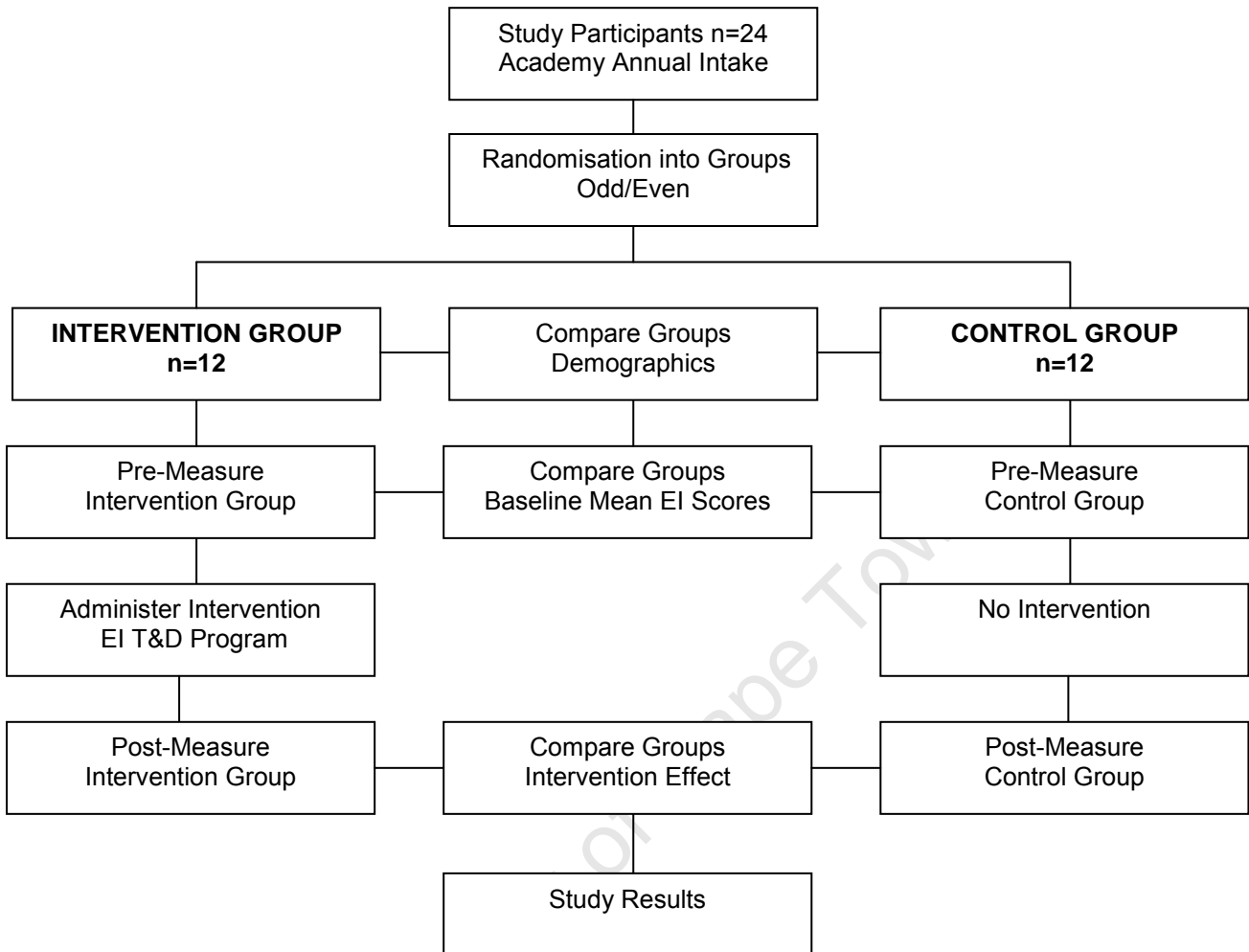


Figure 6.3: *Graphic Representation of Study Design.*

MEASURING CHANGES IN EI FROM PRE TO POST MEASUREMENT

The change in terms of number of units of EI of each individual player's EI profile scores from pre to post measurement was established, and the mean change for each group was calculated in terms of units and percentage at the Total EI and Branch levels.

DATA ANALYSIS

The descriptive statistics such as means and frequencies were calculated for the baseline comparison of the two groups. The mean EI scores and subscores were formally compared between the intervention and control groups at baseline using a 2-sample test. Descriptive statistics were also calculated for both groups post intervention. These statistics were complemented with estimated differences and 95% confidence intervals between the groups at each time point. For the inference of the trial outcome analysis of covariance was used. The baseline value of the corresponding outcome variable was used as the covariate together with the intervention and time (year) indicators. For each analysis of covariance the equality of the slopes were tested within and between years, and the treatment effect and 95% confidence intervals were estimated from the basic model with main effects only.

Scatterplots (shown in Figures 6.4-8) were constructed to present a graphical comparison between the intervention and control for the trial, and depict the linear regression lines of Post scores on the Pre scores for each year. In accordance with the model the estimated intervention effect was calculated.

RESULTS

The demographic information of the cricketers randomized to the two groups for both years is presented in Table 6.1.

Table 6.1: Demographics for the players randomised to the 2 different arms of the study.

		Control			Intervention		
		2007	2008	Total	2007	2008	Total
Age in years (mean(sd))		21.2 (1.3)	21.0 (2.0)	21.1 (1.7)	22.9 (1.7)	21.9 (1.2)	22.4 (1.6)
Home language (freq.)							
	Afrikaans	5	0	5 (20.8%)	5	3	8 (33.3%)
	African	1	1	2 (8.3%)	2	1	3 (12.5%)
	English	6	11	17 (70.9%)	5	8	13 (54.2%)
Education (freq.)							
	Matric	3	12	15 (62.5%)	2	9	11 (45.8%)
	Diploma	5	0	5 (20.8%)	5	0	5 (20.8%)
	Bachelors Degree	4	0	4 (16.7%)	4	3	7 (29.2%)
	Honours Degree	0	0	0 (0.0%)	1	0	1 (4.2%)
Cricket experience (Level)							
	First class	12	12	24	12	12	24

Apart from a small age difference the randomization resulted in a good balance in the two groups. Age was not significantly associated with any of the baseline outcome variables.

The descriptive statistics for the baseline (Pre) and outcome (Post) range of individual scores and number of changes are shown in Table 6.2, and the mean measurements, drawn from the individual scores, and mean changes observed within each group for both years are shown in Table 6.3.

The randomization also ensured a reasonable balance between the groups for both years as is evident from the observed differences.

Table 6.2: 2007/2008 Intervention group Pre and Post range of individual Total EI and Branch scores and number of individual score changes.

Intervention n = 12					
Range of scores	TEI	PER	FAC	UND	MAN
2007 Pre	69-97	81-105	70-94	72-89	67-88
2007 Post	75-111	89-119	72-103	80-109	72-103
No: > < =	12> 0< 0=	12> 0< 0=	12> 0< 0=	12> 0< 0=	12> 0< 0=
Intervention n = 12					
Range of scores	TEI	PER	FAC	UND	MAN
2008 Pre	75-110	83-111	73-106	77-103	78-115
2008 Post	87-127	96-118	82-112	86-120	84-126
No: > < =	12> 0< 0=	12> 0< 0=	12> 0< 0=	12> 0< 0=	12> 0< 0=

As is shown in Table 6.2, all participants (n=12) in both years recorded post intervention increased individual scores, which are reflected in the changes in the range of scores.

CHAPTER 6

	Control				Intervention				Total			95% Confidence Interval			p-value	
	2007	2008		Total	2007	2008		Total	Mean diff	Lower	Upper					
	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	Mean diff	Lower	Upper	
TEI																
Pre	81.8	5.2	87.4	8.0	84.6	7.2	84.9	7.3	89.4	11.2	87.2	9.6	2.5	-2.4	7.5	0.3036
Post	83.4	6.2	84.8	8.1	84.1	7.1	96.6	10.4	101.7	11.6	99.1	11.1	15.0	9.6	20.4	<.001
Change: Units (%)	1.6 (2.0)	2.3	-2.7 (-3.1)	3.3	-0.5 (-0.6)	2.1	11.7 (13.7)	3.7	12.3 (13.8)	4.7	12.0 (13.8)	3.0	12.5 (14.5)	10.2 (11.9)	14.6 (17.2)	<.001
PER																
Pre	87.7	7.8	93.9	10.4	90.8	9.6	92.0	6.7	93.1	8.8	92.5	7.7	1.8	-3.3	-6.8	0.4879
Post	90.2	8.0	91.7	10.5	90.9	9.2	104.3	8.8	106.5	7.7	105.4	8.2	14.5	9.4	19.5	<.001
Change: Units (%)	2.5 (2.9)	3.2	-2.3 (-2.4)	4.3	0.1 (0.1)	2.7	12.3 (13.4)	3.2	13.4 (14.4)	3.4	12.9 (13.8)	2.3	12.8 (14.0)	10.3 (11.2)	15.5 (17.2)	<.001
FAC																
Pre	79.9	7.9	82.1	5.7	81.0	6.8	85.4	8.0	87.4	8.9	86.4	8.4	5.4	1.0	9.9	0.0177
Post	77.1	8.5	78.9	4.0	78.0	6.6	92.4	10.3	95.5	8.7	94.0	9.5	16.0	11.2	20.7	<.001
Change: Units (%)	-2.8 (-3.5)	3.4	-3.2 (-3.9)	2.0	-3.0 (-3.7)	1.9	7.0 (8.2)	3.8	8.1 (9.3)	3.6	7.5 (8.7)	2.6	10.5 (12.5)	8.7 (10.4)	12.7 (15.2)	<.001
UND																
Pre	81.0	4.2	84.3	6.5	82.7	5.6	81.5	5.6	87.8	9.1	84.6	8.1	2.0	-2.1	6.0	0.3347
Post	84.8	5.8	84.7	7.9	84.8	6.8	94.4	8.9	103.3	10.1	98.9	10.4	14.1	9.0	19.2	<.001
Change: Units (%)	3.8 (4.7)	2.1	0.3 (0.4)	2.9	2.1 (2.5)	1.8	12.9 (15.8)	3.0	15.6 (17.8)	3.9	14.3 (16.9)	2.7	12.2 (14.6)	9.8 (11.7)	13.8 (16.5)	<.001
MAN																
Pre	79.1	5.8	86.4	6.2	82.8	6.9	77.8	6.6	92.4	11.5	85.1	11.9	2.3	-3.3	8.0	0.4095
Post	82.1	6.8	87.2	6.8	84.6	7.2	90.7	9.5	105.5	12.0	98.1	13.0	13.4	7.3	19.6	<.001
Change: Units (%)	3 (3.8)	2.6	0.8 (0.9)	2.7	1.9 (2.3)	2	12.9 (16.6)	3.3	13.1 (14.2)	4.8	13.0 (15.3)	3.6	11.1 (13.2)	8.8 (10.5)	13.1 (15.6)	0.001

Table 6.3: Mean EI Pre and Post scores and estimated intervention effect.

PRIMARY OUTCOMES

Total EI

The combined Total EI scores in the control and intervention arms were not significantly different at baseline. The estimated intervention effect, taking into account year of study and baseline Total EI score is 12.5 units (95% CI: 10.2 to 14.6), $p < .001$. The overall estimated intervention effect for the percentage change in Total EI score over both years is 14.5% (95% CI: 11.9 to 17.2%) and is significant ($p < .001$).

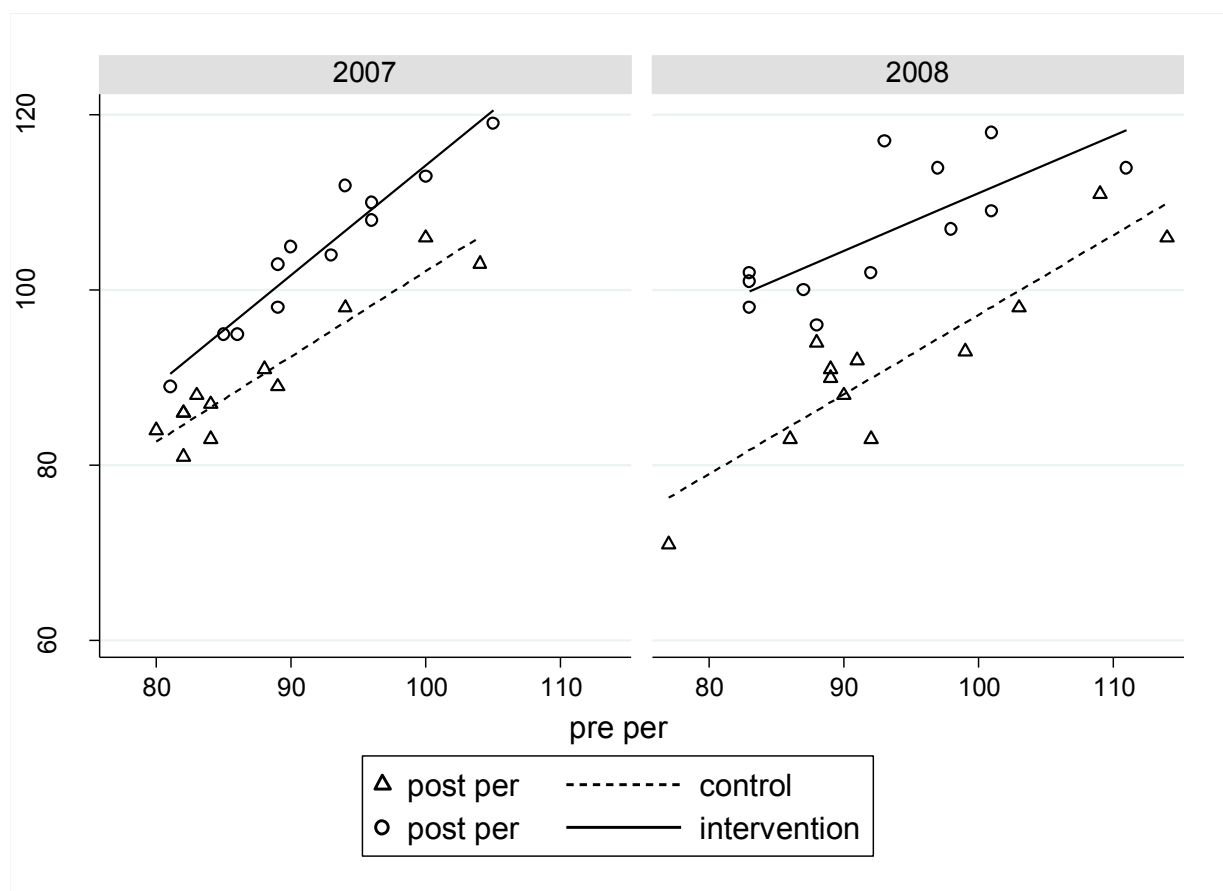


Figure 6.4: Scatterplot of Total EI Pre and Post scores by group by year.

Branch subscores

Perception (PER)

The combined PER EI subscores in control and intervention arms were not significantly different at baseline. The estimated intervention effect taking into account year of study and baseline PER EI score is 12.9 units (95% CI: 10.3 to

15.5), $p < 001$. The overall estimated intervention effect for the percentage change in PER EI score over both years is 14% (95% CI: 11.2 to 17.2%) and is significant ($p < 001$).

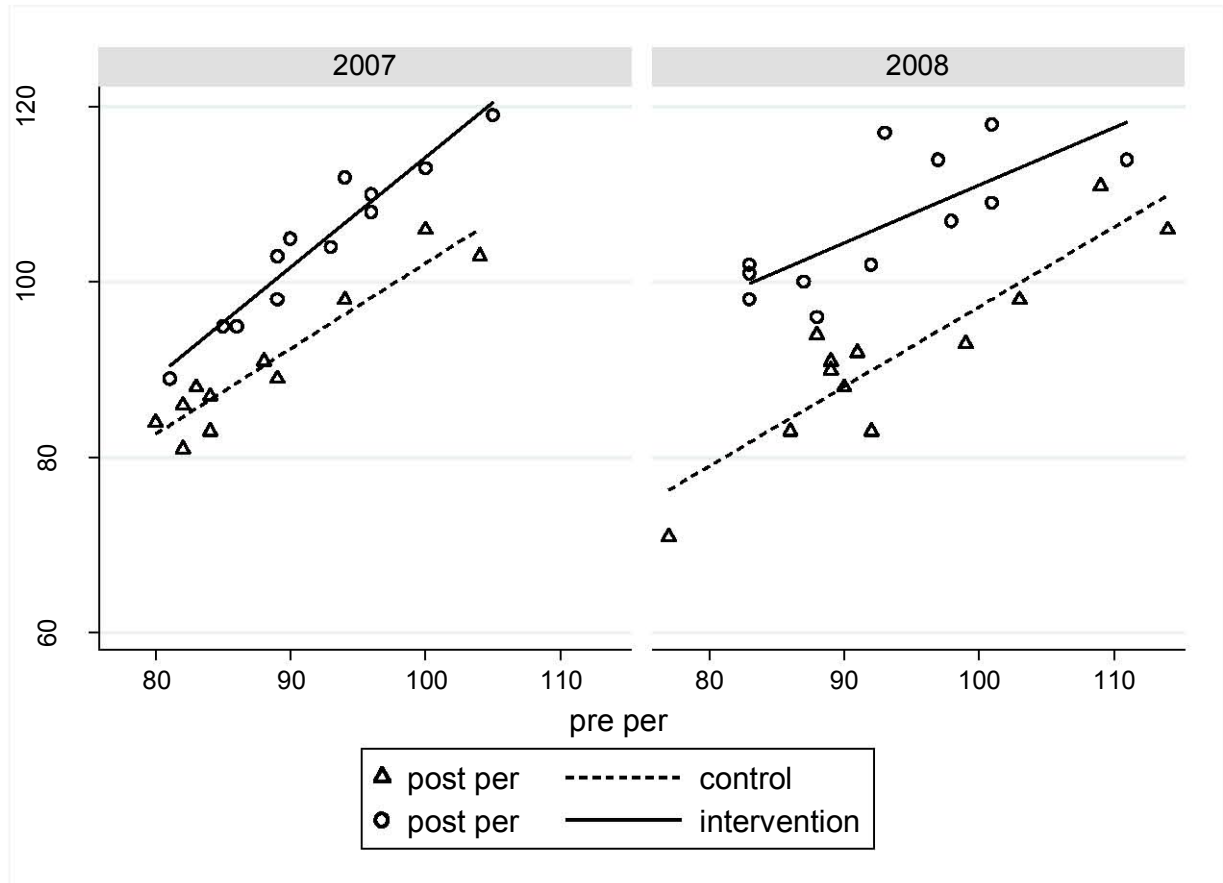


Figure 6.5: Scatterplot of Perception Pre and Post scores by group by year.

Facilitation (FAC)

The combined FAC EI subscores in control and intervention arms were significantly different at baseline, $p = 0177$. The intervention group had higher scores. The estimated intervention effect taking into account year of study and baseline FAC EI score is 7.5 units (95% CI: 8.7 to 12.7), $p < 001$. The overall estimated intervention effect for the percentage change in FAC EI score over both years is 12.5% (95%CI: 10.4 to 15.2%) and is significant ($p < 001$).

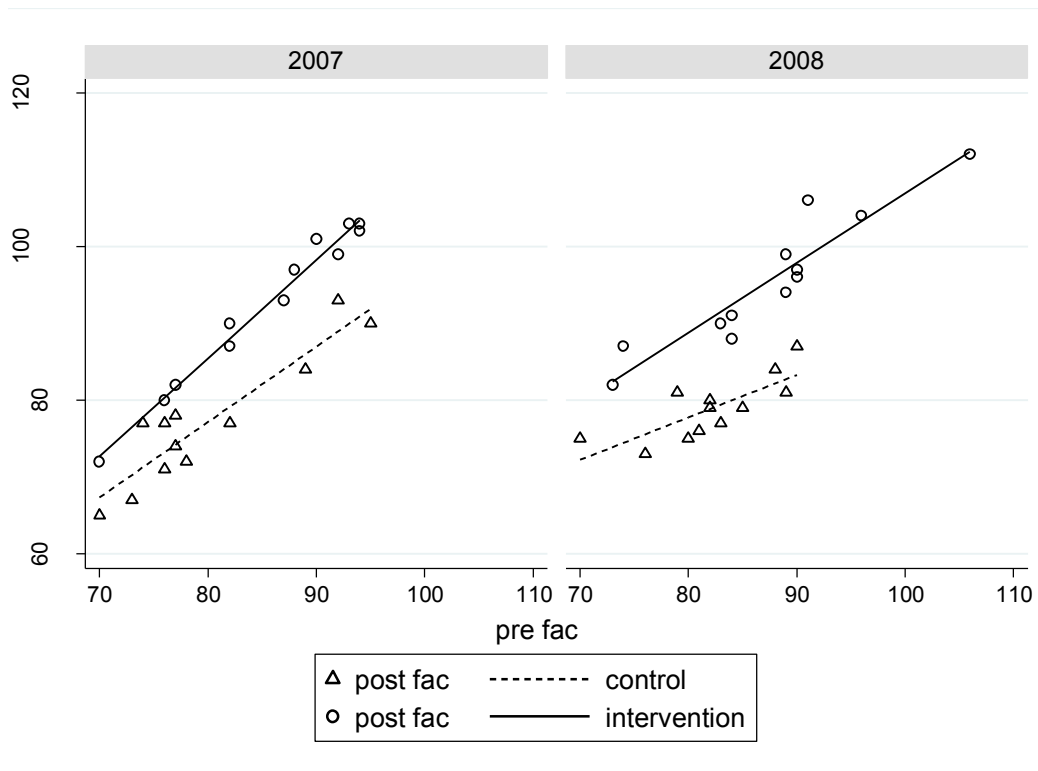


Figure 6.6: Scatterplot of Facilitation Pre and Post scores by group by year.

Understanding (UND)

The combined UND EI subscores in control and intervention arms were not significantly different at baseline. The estimated intervention effect taking into account year of study and baseline UND EI score is 14.3 units (95% CI: 9.8 to 13.8), $p < .001$. The overall estimated intervention effect for the percentage change in UND EI score over both years is 14.6% (95%CI: 11.7 to 16.5%) and is significant ($p < .001$).

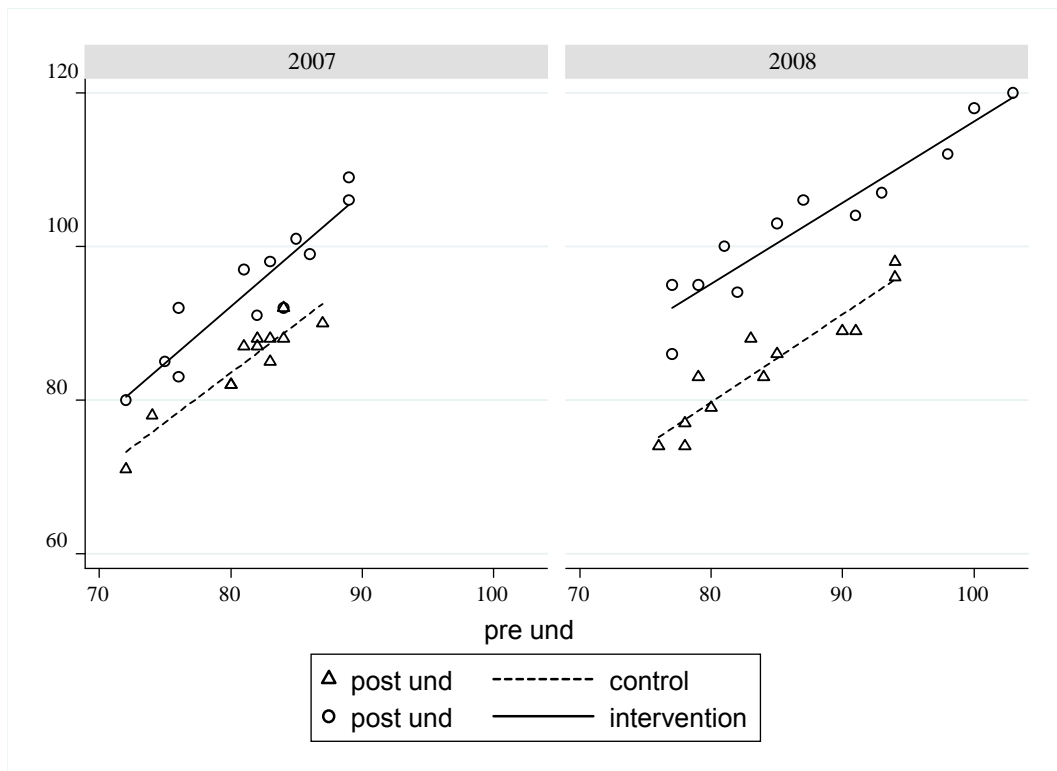


Figure 6.7: Scatterplot of Understanding Pre and Post scores by group by year.

Managing (MAN)

The combined MAN EI subscores in control and intervention arms were not significantly different at baseline. The estimated intervention effect taking into account year of study and baseline MAN EI score is 11.1 units (95% CI: 8.8 to 13.1), $p < .001$. The overall estimated intervention effect for the percentage change in MAN EI score over both years is 13.2% (95%CI: 10.5 to 15.6%) and is significant ($p < .001$).

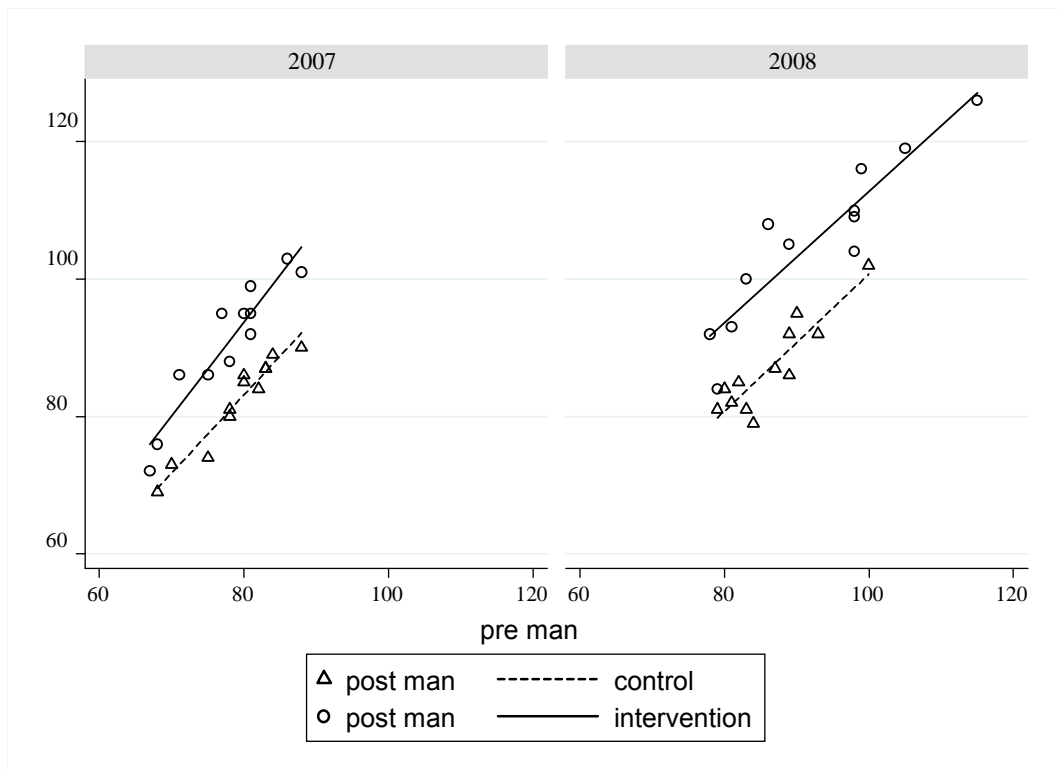


Figure 6.8: Scatterplot of Managing Pre and Post scores by group by year.

DISCUSSION

The hypothesis tested in this study was that the EI scores of individual cricketers could be developed through the intervention of an EI training and development program. Accordingly, the first important finding of this study was that there was a positive association between the EI training and development program as delivered in the setting of this longitudinal trial and the mean EI scores of individual cricketers post intervention (Table 6.3).

The intervention was successful in significantly increasing the Total EI scores for each year. Further, this positive outcome also pertained for the Branch subscores, albeit with some differences in effect between years. Relative to the intervention group the control group scores showed only a slight change from the baseline scores for each year. To our knowledge this relationship has not previously been shown.

The following factors may have played a role in the intervention outcomes of this study.

Firstly, in designing the intervention program cognizance was taken of recommended guidelines that have been advocated as critical for the attainment of substantive and long-term EI training and development outcomes [94,105]. The extent to which these guidelines informed the design and implementation of the program devised for this study likely contributed to the positive intervention results.

Secondly, the conceptualisation of EI used in this study was informed by the work of Mayer et al [25]. Their and related views were consulted by the authors, in particular on how to approach the development of the four different skill branches that comprise EI as set out in the ability model [86,105]. Unlike mixed model approaches to EI, which are flawed in their inclusion of a host of unrelated personality competencies, it is felt that the narrow scientific conception and focus of the ability model followed in this study likely contributed to the positive intervention outcomes.

Thirdly, the program made extensive use of experiential learning case studies, comprising generic cases as well as specific ones that relate to “performance under pressure” situations in cricket, both on and off the field of play. The cases afforded the intervention group the opportunity to gain an understanding of sports performance in terms of the relationship between their physical game and mental game/emotional control, and in particular the role played by emotional intelligence, both at a total level as well as each of the branches.

The generation of the specific case studies benefitted from interviews and focus group discussions with both present and past professional cricketers, including iconic “legends in their time” players whose experience ran the entire performance gamut from school to Test cricket. These specific cases enhanced the program and study results because they exemplified both success and failure in dealing with the central issue of emotional control in “performance under pressure” situations that characterise the game, and to which the intervention group could relate. Also, of equal importance the cases carried the hallmark of credibility and relevance by virtue of the cricketing sources from which they were drawn.

Fourthly, in order to have been selected for attendance at the prestigious South African National Cricket Academy, the emerging players taking part in this study

would have undoubtedly demonstrated intrinsic motivation by virtue of their passion for playing cricket. It is reasonable to conclude that this disposition extended to a desire on the part of each player to develop their cricketing skills so as to play the game at the highest level. Seen in this light, the EI training and development program used in this study would have been welcomed and taken seriously, and perforce the concomitant level of engaging in the intervention process enhanced the outcomes. Added to this, extrinsic motivation can be seen to have played a positive role, for the emerging players were only too well aware that they were following in the footsteps of current and past professional players whose careers were forged in no small measure on the advanced high performance training and development provided at the Academy. Such development underwrites the transition from emerging to established professional player, and is founded upon the cricketing skills needed to lay claim to a professional contract, to take part in major competitions, and possible selection to play for the national team. Adding to this motivational setting is the fact that the Academy full-time coaching staff are comprised of “role model” ex-professional cricketers, as well as leading experts from related disciplines that are brought in to give specialist coaching sessions, and in so doing pass on the proverbial baton of high performance to the “legends in the making”. In this regard, the credibility and effectiveness of the facilitator of the program used in this study in terms of both scientific EI knowledge and training and development expertise was further enhanced by first hand and extensive experience of competing in “performance under pressure” sporting situations, as well as sports coaching. Such facilitator attributes can be seen to have added to the efficacy of the program and perforce contributed to the results.

LIMITATIONS OF THE STUDY

In line with the view that in general terms effective training and development is contingent upon an adequate delivery time frame [94], the authors acknowledge that the extent to which the improved EI skills implicit in the intervention outcomes of this study will remain operative over time is not known. Specifically the study design did not make provision for post intervention long-term assessment and training so as to monitor and reinforce the increased EI scores/skills reflected in the study results.

A further limitation of the study was the reliance on a single facilitator, who was effectively integral to the intervention design. It seems reasonable to suggest that not all facilitators are made equal, and thus the results of this study can be seen in part to be dependent upon the effectiveness of the facilitator. Lastly, the sample size was modest; thereby inhibiting the extent to which generalisations can be made beyond the cohort from the study results.

IMPLICATIONS OF THE STUDY

The findings of this study have implications for sports science research, education and coaching of individual athletes and teams. Future research needs to explore EI intervention program design, including duration, as well as efforts to ascertain appropriate follow-up and an ongoing EI training regimen to reinforce initial intervention effect outcomes. It is felt that this would be desirable in order to monitor the retention of the learned EI skills as well as promoting their continued development. Coaching of cricket traditionally emphasises the physical game, with players receiving regular practice and development through training sessions in the nets, video analysis of batting and bowling technique, fielding routines etc. It is suggested that to this should be added the benefit of regular “EI practice”. In this regard, it is suggested that the efficacy of both physical and EI coaching would arguably be enhanced if the skills profile of coaching staff included having received EI training and development, as well as the provision of EI coaching expertise forming part of cricketing coaching strategies. It is also suggested that future EI training and development research should include a focus on other sports disciplines, both individual and team format, as well as female sports.

ACKNOWLEDEMENTS

The authors wish to acknowledge the assistance of Cricket South Africa and, in particular, Mr Vince van der Bijl, General Manager Cricket Development. The authors would also like to thank Jopie van Rooyen & Partners SA for their support in the assessment process.

COMPETING INTERESTS

The author/s undertake that there are no competing interest with regard to this research study

FUNDING

Funding for this research study was provided by the author/s

University of Cape Town

CHAPTER 7: Importance of the studies.

7.1 Previously unknown and significant EI and sports performance relationships established

The point of departure of this thesis was to undertake empirical research focused on an examination of the role of the relatively new construct EI in sports performance. In particular, this line of enquiry was founded upon the hypothesis that EI differentiates high from low sports performance. In this regard the importance of the studies undertaken in support of this thesis rests fundamentally in the generation of significant findings that serve to establish relationships between EI and sports performance.

Specifically, the findings of the first study indicated that Team EI predicts the sports performance of teams in a national cricket competition, and this relationship was confirmed by similar results when the study was repeated, thereby adding year-on-year comparative and pooled data credence to the findings/thesis. In terms of the second study, the findings highlighted a relationship insofar as the EI profile scores of individual cricketers can be increased, and perforce the competitive advantage of their team, through an EI training and development intervention program, with similar results being attained when the study was replicated in order to strengthen the findings/thesis with year-on-year and pooled data. To the best of our knowledge these relationships have not previously been shown and this underwrites the importance of the studies.

7.2 Duality model of sports performance developed

Integral to the studies was the development and presentation of a duality model of sports performance that sought to inform and demonstrate the posited role of physical and mental (EI) capacities as joint drivers of performance. In this regard, the model enhances the importance of the studies in that, as highlighted in the first study, it captures the need for not only a high level of physical capacity, but also a high level of mental capacity (EI) in order to deal with performance under pressure and shifts in attention issues that are central to achieving the requisite emotional control for high performance as opposed to being emotionally hijacked. Implicit in the model is the fact that in the case of the sport of cricket this imperative of a duality of

capacities is applicable to all team members in the fielding and batting sides, both on and off the field of play.

7.3 EI training and development program developed

An important feature, and major strength of the research design and methodology of the second study was the development of an experiential case study based EI training and development intervention program. This program was founded upon both generic and sports specific (cricket) experiential cases, together with an analytical framework for the identification and understanding of the role played by EI at the total and branch level of analysis, as well as the provision of an experiential diary for reinforcing learned objectives and self-development. In the workshop presentation format of this program participants were able to increase their grasp of the role of EI by discussing their own generic and cricket specific experiences through the lens of the analytical framework, thereby personalising and enhancing the richness and relevance of the training and development material and process.

7.4 Demonstrated that EI profile scores of individual athletes can be increased through an EI intervention training and development program.

As noted previously, an important strength of the studies lies in being informed by the duality of capacities model to highlight the need for individual cricketers to focus on developing both their physical and mental (EI) capacities. Given the predictive findings of EI and sports performance in the first study, it follows that individual cricketers would benefit from increasing their EI profiles scores, and perforce their team's EI and competitive advantage, with such development being shown to be feasible as set out in the EI intervention program and findings reported in the second study.

7.5 Adds new knowledge to the literature

Given the paucity of empirical research studies examining the role of EI and sports performance, the studies carried out in support of this thesis can be seen to be important insofar as their research findings are significant and unique, and add new knowledge to the literature.

CHAPTER 8: Quo Vadis EI in Sports Performance Research

8.1 Addressing limitations of research papers presented in this thesis

Drawing on the research undertaken for, and the findings of the two published longitudinal studies presented in this thesis, it is suggested that the way forward for research on the role of EI in sport performance should include addressing the following limitations acknowledged in these studies:

8.1.1 Limitations in the first paper

1) Research data was confined to a single sport (cricket)

The significant positive correlation findings in this study of the relationship between the EI of teams and their sports performance were based exclusively on research data from the sporting code of cricket, and therefore cannot be generalised to other sporting codes. If research into the role of EI in sports performance is to generate findings and new knowledge that has relevance across the full range of sporting codes, future studies must draw representative research data from multiple sports, both team and individual, and also reflecting both genders.

2) Analysis and findings were at the team level

The design of this study was constrained by ethics approval and participant consent to only publish findings at the team level of analysis in order to protect the confidentiality of individual athletes. Whilst this limitation still allowed the study design to test the hypothesis at the team level, it would also have been desirable to show data and findings at the individual level. Thus, future studies of team sports should endeavour to obtain ethics approval and participants consent to analyze and report results at the individual level. Addressing this issue becomes more pressing where individual sporting codes are involved. Also, this issue is tied to the sample size used in a study (limitation 3), with small samples making it problematic to effectively mask the identity of individual results where their sports performance is in the public domain.

- 3) **Competition used to test the hypothesis was limited to six teams**
In order to test the hypothesis that Team EI (IV) predicts team performance (DV) it was necessary to select a team performance measure, and for this purpose the authors used the final log points of teams in a national cricket competition. However, the number of teams in the competition selected was small (six) and therefore problematical from a generalisation of results standpoint. Future studies using teams must therefore endeavour to select a competition with a larger number of teams participating, or find an alternative sample source and performance measure.
- 4) **Scoring EI measures was based upon North American normative scores**
South African normative data were not available when scoring of the EI measures for this study was carried out by the MSCEIT Canadian proprietary owners. Future research studies should endeavour to have the EI measures scored using normative data that matches the source of the research data.
- 5) **No adjustments were made for possible confounding variables**
Assumptions of similarity made in this study of variables that if, in fact, were different could potentially have affected the results. For example, it was assumed that the level of sponsorship received by each team was essentially the same, thereby equalising the financial capacity to offer contracts to top players. Also, parity of the level/quality of coaching expertise was assumed across all the teams. Thus, future research studies using teams must exercise caution with regard to confounding variables and, where necessary, appropriate adjustments must be made.
- 6) **Lack of consensus in the field regarding the nature of the construct EI and its measurement**
As has been noted previously, there remains an ongoing and divisive debate as to the nature and measurement of the construct EI characterised by both controversy and a lack of consensus. Researchers conducting future studies must be fully aware of the unresolved issues and ensure that such knowledge and impartial critical assessment informs and promotes their efforts to

contribute to the field by adherence to the canons of scientific rigour. In particular, it is suggested that researchers take careful note of the discriminant validity and related problems associated with mixed models of EI and self-report measures relative to the original narrow scientific definition of the construct, and ability model conceptualisation founded upon EI as an intelligence, together with the MSCEIT ability approach to its measurement.

8.1.2 Limitations from the second paper

1) **An absence of post-intervention long-term assessment and training to reinforce EI increases**

Future EI development studies must consider how the design of intervention programs can achieve not only EI profile increases over the period of the study, but also promote the retention and improvement of such increases post intervention. In this regard, in the absence of ongoing EI coaching design, considerations must be given to interventions that impart EI self-development skills and tools, such as an experiential diary as described in paper 2 that will empower program participants to monitor, reinforce and increase their EI.

2) **EI Development intervention increases not linked to performance increases**

EI development studies similar to the one carried out in paper 2 make an important contribution to the literature by providing empirical evidence that EI can be increased through intervention programs. However, it is suggested that there is a need for EI development studies that show that any such increases in EI scores translate into increases in sports performance. Thus future EI development studies must extend their aim and design beyond increasing EI profile scores to include empirical evidence that links EI development to increases in sporting performance.

8.1.3 EI and Coaching

The model of sports performance posited in chapter 3 rests upon the duality of physical and mental game (EI) threshold congruence. The inclusion of the mental game (EI) as a joint driver of performance was argued on the basis that athletes and

teams cannot consistently attain high performance relying solely on their physical game, and equally their mental (EI) game. It is suggested that this duality logic can be adapted to a model of coaching, in terms of which the effectiveness of a coach will be dependent upon an adequate level of physical game expertise and tactical acumen, allied to an adequate level of EI skills.

Seen in this light, and given the central role played by coaches in the performance of athletes and teams, it is suggested that from the perspective of future research studies are needed to examine the relationship between the EI of coaches and their coaching performance as measured by the sports performance of their athlete/s or team. This line of enquiry opens up the possibility of identifying EI training and development for coaches as an important driver of improved coaching and performance improved sports performance of athletes and sports teams. This in turn would require future EI research studies to examine how EI training and development of coaches could form part of the coaching process.

REFERENCES

1. Eysenck, H.J. and Eysenck, S.B., *Personality structure and measurement*, Knapp, San Diego, CA, 1969.
2. Fancher, R.E., *The intelligence men: Makers of the IQ controversy*, W.W. Norton, New York, 1985.
3. Gardner, H.A., *Frames of Mind: The Theory of Multiple Intelligences*, Basic Books, New York, 1983.
4. Kamin, L.J., *The Bell Curve debate: History, documents, opinions.*, Times Books, New York, 1995.
5. Siegler, R.S., The other Alfred Binet, *Developmental Psychology*, 1992, 28, 179-190.
6. Weinberg, R.A., Intelligence and IQ: Landmark issues and great debates, *American Psychologist*, 1989, 44, 98-104.
7. Wechsler, D., Non-intellective Factors in General Intelligence, *Psychological Bulletin*, 1940, 37, 444-445.
8. Kaufman, A.S. and Lichtenberger, E.O., *Assessing adolescent and adult intelligence*, John Wiley, New Jersey, 2006.
9. Merlevede, P.E., Bridoux, D., and Vandamme, R., *7 Steps to Emotional Intelligence*, Crown House Publishing Ltd, 2003.
10. Gladwell, M., *Outliers: The Story of Success*, Penquin Books, London, 2009.
11. Jensen, A.R., *Bias in Mental Testing*, Free Press, New York, 1980.
12. Thorndike E.L. 1920. Intelligence and its uses. Harper's Magazine. 140: 227-235.
13. Wechsler, D., *The measurement and appraisal of adult intelligence*, Williams & Wilkins, Baltimore, MD, 1958.
14. Smith M.K. 2008. Howard Gardner and Multiple Intelligences. The encyclopedia of informal education; Available from: <http://www.infed.org/thinkers/gardner.htm>.
15. Sternberg, R.J., *Beyond IQ; A triarchic theory of human intelligence*, Cambridge University Press, New York, 2010.
16. Ekman, P., *Darwin and facial expression: A century of research in review*, Academic Press, New York, 1973.
17. Mayer, J.D., How mood influences cognition, in: Sharkey, N.E., eds, *Advances in Cognitive Science*, Ellis Horwood, Chichester, 1986, 290-314.

REFERENCES

18. Buck, R., *The Communication of Emotion*, Guilford, New York, 1984.
19. Marlowe, H.A., Social intelligence: Evidence for multidimensionality and construct interdependence, *Journal of Educational Psychology*, 1986, 78, 52-58.
20. Dyer, M.G., The role of affect in narratives, *Cognitive Science*, 1984, 7, 211-242.
21. Salovey, P. and Mayer, J.D., Emotional intelligence, *Imagination, Cognition, and Personality*, 1990, 9, 185-211.
22. Chiarochi, J., Chan, A. and Caputi, P., A critical evaluation of the emotional intelligence construct, *Personality and individual differences*, 2000, 28, 539-561.
23. Mayer, J.D., DiPaolo, M.D. and Salovey, P., Perceiving affective content in ambiguous visual stimuli: A component of emotional intelligence, *Journal of Personality Assessment*, 1990, 54, 772-781.
24. Mayer, J.D. and Salovey, P., The intelligence of emotional intelligence, *Intelligence*, 1993, 17, 433-442.
25. Mayer, J.D., Caruso, D.R. and Salovey, P., Emotional intelligence meets traditional standards for an intelligence, *Intelligence*, 1999 267-298.
26. Ciarrochi, J., Chan, A., Caputi, P. and Roberts, R., Measuring Emotional Intelligence, in: Ciarrochi, J., Forgas, J.P., Mayer, J.D. and ., eds, *Emotional intelligence in everyday life: A scientific enquiry*, Psychology Press, Philadelphia,PA, 2001
27. Goleman, D., *Emotional intelligence*, Bantam, New York, 1995.
28. Bar-On, R., *The Emotional Quotient Inventory (EQ-i): Technical Manual*, Multi Health Systems, Toronto, 1997.
29. Mayer, J.D., Salovey, P. and Caruso, D.R., Models of Emotional Intelligence, in: Sternberg, R.J., eds, *Handbook of Human Intelligence (2nd ed)*, University Press, New York Cambridge, 2000, 396-420.
30. Daus, C.S. and Ashkanasay, N.M., Will the Real Emotional Intelligence Please Stand Up? On Deconstructing the Emotional Intelligence "Debate", *The Industrial-Organisational Psychologist*, 2003, 41, 69-72.
31. Mayer, J.D., Chiarochi, J. and Forgas, J.P., Emotional Intelligence and Everyday Life: An Introduction, in: Chiarochi, J., Forgas, J.P. and Mayer, J.D., (eds), *Emotional Intelligence In Everyday Life: A Scientific Inquiry*, Psychology Press, New York, 2001, xi-xviii

REFERENCES

32. Mayer, J.D., Salovey, P. and Caruso, D.R. *Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT): User's manual*, Multi-Health Systems, Inc, Toronto, ON, 2002
33. Bar-On, R. and Parker, J.D.A., Introduction, in: Bar-On, R. and Parker, J.D.A., eds, *The Handbook of Emotional Intelligence*, Jossey-Bass, San Francisco, 2000
34. Boyatzis, R.E., *The competent manager: A model for effective performance*, John Wiley & Sons, New York, 1982
35. Bar-On, R., The Bar-On model of emotional-social intelligence, *Psicothema*, 2006, 18, 13-25.
36. Boyatzis, R.E., Goleman, D. and Rhee, K.S., Clustering competence in emotional intelligence: insights from the Emotional Intelligence Inventory, in: Bar-On, R. and Parker, J.D.A., eds, *Handbook of emotional intelligence*, Jossey-Bass, New York, 2000, 343-362.
37. Orioli, E., *EQ Map*, Essi, San Francisco, 1997.
38. Schutte, N.S., Malouff, J.M., Hall, L.E., Haggerty, D.J., Cooper, J.T., Golden, C.J. and Dornheim, L. *Development and validation of a measure of emotional intelligence*, 1998, 167-177.
39. Davies, M., Stankov, L. and Roberts, R.D., Emotional intelligence: In search of an elusive construct, *Journal of Personality and Social Psychology*, 1998, 75, 989-1015.
40. Schrauger, J.S. and Osberg, T.M., The relative accuracy of self- predictions and judgments about others in psychological assessment, *Psychol.Bul.*, 1981, 90, 322-351.
41. Breakwell, G., Hammond, S., and Fyfe-Schaw, C., *Research Methods in Psychology*, Sage Publications, London, 1995.
42. Fernandes, M.F. and Randall, D.M., The Nature of Social Desirability Response Bias Effects n Ethics Research, *Business Ethics Quarterly*, 1992, 2, 183-205.
43. Zeng, X. and Miller, C.E., Examinations of Measurements of Emotional Intelligence, *Ergometrika*, 2003, 3, 38-49.
44. Mayer, J.D., Salovey, P., Caruso, D.R. and Sitarenios, G., Emotional Intelligence as a Standard Intelligence, *Emotion*, 2001, 1, 232-242.
45. Roberts, R.D., Zeidner, M. and Matthews, G., Does Emotional Intelligence Meet Traditional Standards for an Intelligence? Some New Data and Conclusions, *Emotion*, 2001, 1, 196-231.

REFERENCES

46. Meyer, B.B. and Fletcher, T.B., Emotional intelligence: A theoretical overview and implications for research and professional practice, *Journal of Applied Sport Psychology*, 2007, 19, 1-15.
47. Beilock, S.L., Understanding skilled performance: Memory, attention, and "choking under pressure", in: Morris, T., Terry, P. and Gordon, S., eds, *Sport & Exercise Psychology: International Perspectives*, Fitness Information Technology, Morgantown, WV, 2007, 153-166.
48. Baumeister, R.F., Choking under pressure: self-consciousness and paradoxical effects of incentives on skillful performance, *J.Pers.Soc.Psychol.*, 1984, 46, 610-620.
49. Beilock, S.L. and Carr, T.H., On the fragility of skilled performance: what governs choking under pressure?, *J.Exp.Psychol.Gen.*, 2001, 130, 701-725.
50. Lewis.B. and Linder, D., Thinking about choking: Attentional processes and paradoxical performance, *Personality and Social Psychology Bulletin*, 1997 937-944.
51. Gray, R., Attending to the execution of a complex sensorimotor skill: expertise differences, choking, and slumps, *J.Exp.Psychol.Appl.*, 2004, 10, 42-54.
52. Epstein, S., *Constructive Thinking: The Key to Emotional Intelligence*, Praeger, Westport, CT, 1998.
53. Crombie, D.T., Lombard, C. and Noakes, T.D., Emotional Intelligence Scores Predict Team Sports Performance in a National Cricket Competition , *International Journal of Sports Science & Coaching*, 2009, 4, 209-224.
54. Starkes, J.L. and Ericsson, K.A., *Expert performance in sport: Advances in Research on Sport Expertise*, Human Kinetics, Champaign, Ill, 2003.
55. Hanin, Y.L., *Emotions in Sport*, Human Kinetics, Champaign, Ill, 2000.
56. Perlini, A.H. and Halverson, T.R., Emotional Intelligence in the National Hockey League, *Canadian Journal of Behavioural Science*, 2006, 38, 109-119.
57. Beedie, C.J., Terry, P.C. and Lane, A.M., The Profile of Mood States and Athletic Performance: Two meta-analyses, *Journal of Applied Sport Psychology*, 2000 49-68.
58. Hanin, Y.L., Performance Related Emotional States in Sport, *Forum: Qualitative Social Research*, 2003, 4(1).
59. Locke, A., If I'm Not Worried, I'm Nervous. Does That Make Sense? The Use of Emotion Concepts by Athletes in Accounts of Performance, *Forum: Qualitative Social Research*, 2003, 4(1).
60. Lane, A.M., Soos, I., Leibinger, E., Karsai, I. and Hamar, P. (2005). Emotional Intelligence, mood states and successful and unsuccessful performance.

REFERENCES

- Annual Conference of the British Association of Sport and Exercise Sciences*, Loughborough, UK. Conference Proceedings on Conference, CD-Rom, Oral Presentation, 2005.
61. Jones, G. and Hanton, S., Pre-competitive feeling states and directional anxiety interpretations, *Journal of Sports Sciences*, 2001, 19, 385-395.
 62. Covassin, T. and Pero, S., The Relationship between Self-Confidence, Mood State and Anxiety among Collegiate Tennis Players, *Journal of Sport Behaviour*, 2004 230-242.
 63. Cohen, A.B., Tenenbaum, G. and English, R.W., Emotions and golf performance: An IZOF-based applied sport psychology case study, *Behav.Modif.*, 2006, 30, 259-280.
 64. Gould, D., Hardy, L., Medbery, R., Dieffenbach, K., Lauer, L., Damarjian, N. and Jones, G. (1999). Identifying the range of emotions in sport achievement striving. *Paper Presented at the Association for the Advancement of Applied Sport Psychology, Banff, Canada*, 1999.
 65. Robins, S., A consultant's guide to understanding and promoting emotional intelligence in the workplace, in: Lowman, R., eds, *Handbook of Organizational Consulting Psychology*, John Wiley & Son, New York, 2002
 66. Mayer, J.D., Salovey, P., Caruso, D.R. and Sitarenios, G., Measuring emotional intelligence with the MSCEIT V2.0, *Emotion*, 2003, 3, 97-105.
 67. Parker, J.D.A., Summerveldt, L.J., Hogan, M.J. and Majeski, S.A., Emotional intelligence and academic success:: Examining the transition from high school to university, *Personality and individual differences*, 2004, 163-172.
 68. Cavallo, K. and Brienza, D., Emotional competence and leadership excellence at Johnson & Johnson: The Emotional Intelligence and Leadership Study, *Consortium for Research on Emotional Intelligence in Organizations*, 2004, 1-12
 69. Druskat, V.U., Sala, F., and Mount, G., *Linking emotional intelligence and performance at work: Current Research Evidence With Individuals and Groups*, Psychology Press, 2005.
 70. Folkert, K. *The Emotionally Intelligent Team*. Centre for Collaborative Organisations, University of Texas, 1999
 71. Druskat, V.U. and Wolff, S.B., Building the emotional intelligence of groups, *Harvard Business Review*, 2001, 79, 80-90, 164.
 72. Barsade, S. and Gibson, D., Group emotion: A view from top and bottom, in: Mannix, B. and Neale, M., eds, *Research in Managing Groups and Teams*, JAI Press, Greenwich, CT, 1998, 81-102.

REFERENCES

73. Totterdell, P., Kellett, S., Teuchmann, K. and Briner, R.B., Evidence of mood linkages in work groups, *Journal of Personality and Social Psychology*, 1998 1504-1515.
74. Amason, A.C., Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams, *Academy of Management Journal*, 2008, 39, 123-148.
75. Crombie, D.T. (2004). From Strategic Intent to Organisational Performance: The Role of Trust as Competitive Advantage. 2nd International Conference on Contemporary Management. Stellenbosch, SA. p1-25.
76. Crocker, P.R.E. and Graham, T.R., Emotion in sport and physical activity: The importance of perceived individual goals, *International Journal of Sport Psychology*, 1995, 26, 117-137.
77. Pensgaard, A.M. and Duda, J.L., SYDNEY 2000: The interplay between goal orientations, emotions, coping, and the performance of Olympic-level athletes, *The Sports Psychologist*, 2003, 17, 253-267.
78. Jordan, M., *I can't accept not trying: Michael Jordan on the Pursuit of Excellence*, Harper, San Francisco, 1994.
79. Zizzi, S.J., Deaner, H.R. and Hirschhorn, D.K., The Relationship Between Emotional Intelligence and Performance Among College Basketball Players, *Journal of Applied Sports Psychology*, 2003 262-269.
80. Holt, N.L., Coping in Professional Sport: A Case Study of an Experienced Cricket Player, *Athletic Insight*, 2003, 5, 1-10.
81. Mayer, J.D., A Field Guide to Emotional Intelligence, *Emotional Intelligence in Everyday Life: A Scientific Inquiry*, Psychology Press, New York, 2001, 3-24.
82. Brackett, M.A. and Mayer, J.D., Convergent, discriminant, and incremental validity of competing measures of emotional intelligence, *Personality and Social Psychology Bulletin*, 2003, 29, 1147-1158.
83. Conte, J.M., A review and critique of emotional intelligence measures, *Journal of Organizational Behavior*, 2005, 26, 443-440.
84. Zeidner, M., Roberts, R.D. and Mathews, D., The Science of Emotional Intelligence: Current Consensus and Controversies, *European Psychologist*, 2008, 13, 64-78.
85. Dulewicz, V. and Higgs, M., Can Emotional Intelligence be developed? *Int.J.of Human Resource Management*, 2004, 15, 95-111.
86. Caruso, D.R. and Salovey, P., *The Emotionally Intelligent Manager: How To Develop and Use the Four Key Emotional Skills of Leadership*, Jossey-Bass, San Francisco, 2004.

REFERENCES

87. Clarke, N., Emotional Intelligence Training: A Case of Caveat Emptor, *Human Resource Development Review*, 2006, 5, 422-441.
88. MacEnrue, M.P., Groves, K.S. and Shen, W., Emotional Intelligence Training: Evidence regarding its Efficacy for Developing Leaders, *Leadership Review*, 2010, 10, 3-26.
89. Lopes, P.N., Cote, S. and Salovey, P., An ability model of emotional intelligence: Implications for assessment and training, in: Druskat, V.U., Sala, F. and Mount, G., eds, *Linking Emotional Intelligence and Performance at Work: Current Research Evidence with Individuals and Groups*, Lawrence Erlbaum, New Jersey, 2005, 53-80.
90. Clarke, N., Developing emotional intelligence through workplace learning: Findings from a case study in healthcare, *Human Resource Development International*, 2006, 9, 447-465.
91. Chiarochi, J. and Mayer, J.D., *Applying Emotional Intelligence: A Practitioner's Guide*, Psychology Press, New York, 2007.
92. Wong, C.S., Foo, M., Want, C. and Wong, P., The feasibility of training and development of EI: An exploratory study in Singapore, Hong Kong and Taiwan, *Intelligence*, 2007, 35, 141-150.
93. Groves, K.S., MacEnrue, M.P. and Shen, W., Developing and measuring the emotional intelligence of leaders, *Journal of Management Development*, 2008, 27, 225-250.
94. Cherniss, C., Goleman, D., Emmerling, R., Cowan, K. and Adler, M. *Bringing Emotional Intelligence to the Workplace*. The Consortium for Research on Emotional Intelligence in Organisations, 1998, 1-34.
95. Zeidner, M., Matthews, G. and Roberts, R.D., Emotional intelligence in the workplace: A critical review, *Applied Psychology: An International Review*, 2004, 53, 371-399.
96. Costa, O.T. and MacRae, R.R., *The NEO Personality Inventory manual*, Psychological Assessment Resources, Odessa, FL, 1985.
97. Law, K.S., Wong, C.S. and Song, L.J., The Construct and Criterion Validity of Emotional Intelligence, and its Potential Utility for Management Studies, *Journal of Applied Psychology*, 2004, 89, 483-496.
98. Brackett, M. and Katulak, N.A., Emotional intelligence in the classroom: Skill-based training for teachers and students, in: Chiarochi, J. and Mayer, J.D., eds, *Improving emotional intelligence: A practitioner's guide*, Psychology Press, New York, 2006, 1-27.
99. Kornacki, S.A. and Caruso, D.R., A Theory-Based, Practical Approach to Emotional Intelligence Training: Ten Ways to Increase Emotional Skills, in:

REFERENCES

- Chiarochi, J. and Mayer, J.D., eds, *Improving emotional intelligence: A practitioner's guide*, Psychology Press, New York, 2007, 53-88.
100. Ajayi M. and Fatokun A.L.A. 2008. Effect of a SixWeek Emotional Intelligence Programme on the Sports Performance of Amateur Athletes in Oyo state of Nigeria. <http://sircretriever.ca/africaresearchaward/documents/EffectofSix-WeekEmotional.pdf>. Available from: <http://sircretriever.ca/africaresearchaward/documents/EffectofSix-WeekEmotional.pdf>.
101. Landy, F.J. and Conte, J.M., *Work in the 21st. century: An introduction to industrial and organisation psychology*, McGraw Hill, 2004.
102. Kaufman, A.S. and Kaufman, J.C., Emotional Intelligence as an aspect of General Intelligence: What would David Wechler Say?, *Emotion*, 2001, 1, 258-264.
103. Mayer, J.D., A Field Guide to Emotional Intelligence, *Emotional Intelligence in Everyday Life: A Scientific Inquiry*, Psychology Press, New York, 2001, 3-24.
104. Mayer, J.D., Caruso, D.R. and Salovey, P., Selecting a measure of emotional intelligence: the case for ability scales, in: Bar-On, R. and Parker, J.D.A., eds, *Handbook of emotional intelligence*, Jossey-Bass, New York, 2000
105. Caruso, D.R. and Wolfe, C.J., Emotional Intelligence in the Workplace, in: Chiarochi, J., Forgas, J.P. and Mayer, J.D., eds, *Emotional Intelligence In Everyday Life: A Scientific Inquiry*, Psychology Press, New York, 2001
106. Goleman, D., *Working with emotional intelligence*, Bantam, New York, 1998.